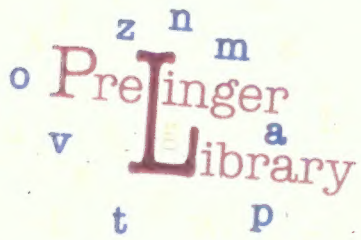
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to Volume 74

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Getting the Most from the

INDEX

THIS is essentially a subject index, rather than an index of titles. An article treating a number of different subjects is listed under each of them. In addition, a geographical reference is published wherever the article relates to a particular railway, city, state or country. Entries about an electric railway in the United States or Canada are listed under the name of the city in which the main office of the company is located. Foreign railways are listed under the country.

In the subject index, an alphabetical arrangement is followed. If there is a choice of two or three keywords, the one most generally used has been selected, cross references being supplied. Below is given a list of keywords arranged under a number of major topics.

As an example of how to use the index, if a reader wishes to locate an article on car design, he would look in the list below at the general topic, "Rolling Stock." Under this topic, the heading, "Car Design and Car Orders," would apply to the article in question. This heading will be found under the letter "C" in the index, with individual articles separately listed.

In addition to the groups of articles covered by these headings, papers and reports from electric railway and other associations are grouped under the names of the various organizations. Biographical information is listed in the personal index.

Signed articles also are indexed by the name of the author. When the name of the author is known to the reader, this supplies the simplest method of locating the article.

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If you are interested in giving your patrons the benefits of the latest practices in comfortable and safe control, allow our engineers to analyze your equipment and make recommendations relative to the use of Variable Automatic Control.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH PENNSYLVANIA

SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES

Westinghouse

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

MORRIS BUCK
Engineering Editor
GEORGE J. MACMURRAY
CLIFFORD A. FAUST
J. W. MCCLOY

JOHN A. MILLER, JR., *Managing Editor*

Vol. 74, No. 1 *Pages 1 to 64*

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Publishing Director

Coming!

DURING 1930

A survey of de luxe bus operations by electric railways

Unit replacement system in railway shops

Analyses of transportation problems in small cities

Statistics of electric railways in foreign countries

Timing of traffic signals

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1930

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A big blowout - - -

without coils

THE simplicity of this control switch has won popularity even beyond the expectation of its designers. The fact that a powerful blowout action is obtained without the use of blowout coils strongly appeals to operators.

This assertion is supported by the highly satisfactory operation of more than 3500 switches sold during the past two years.

Type TC-2 Control and Reset Switch.



We offer you, at a reasonable price, a simple, sturdy, and reliable switch for 600 volts, current up to 25 amperes. For compressor service the maximum current rating is 12 amperes.

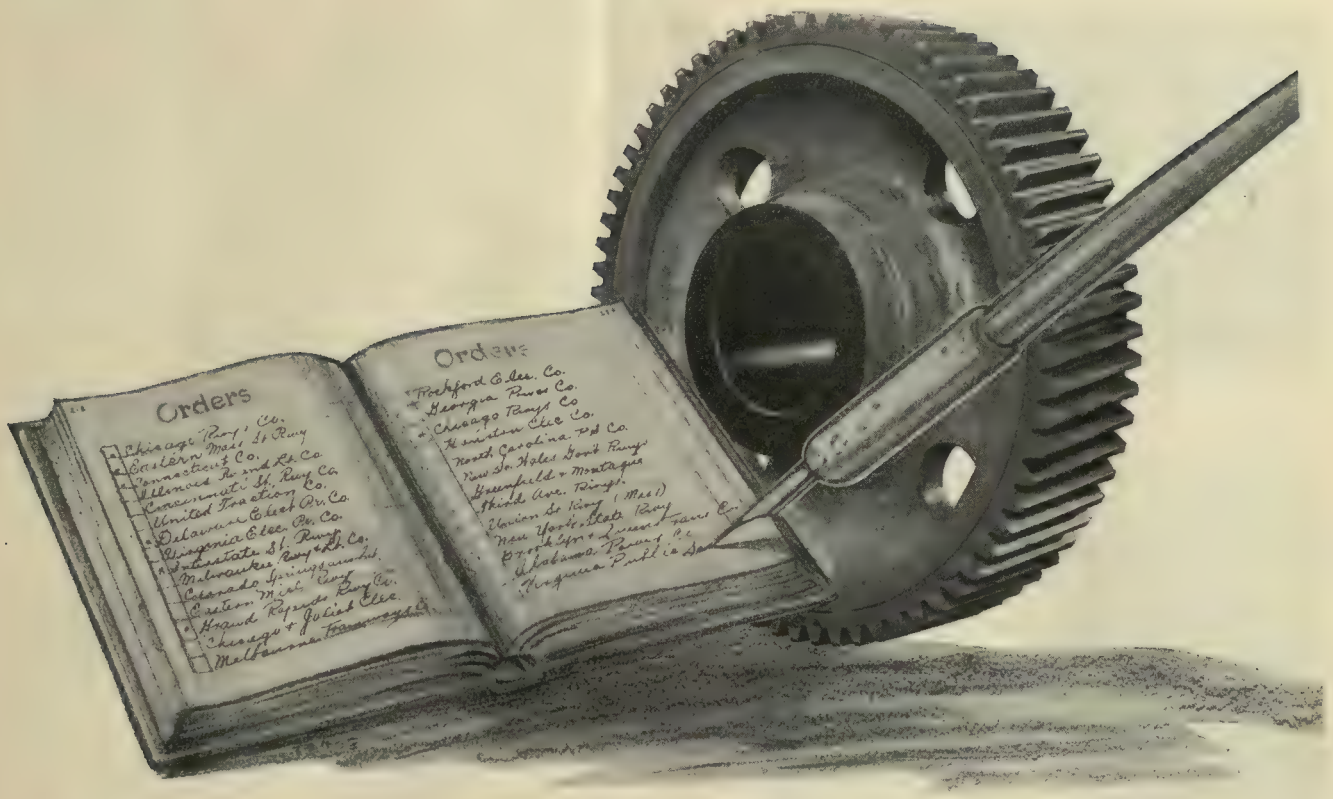
The nearest Westinghouse representative will be glad to furnish you with further information and literature.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
EAST PITTSBURGH PENNSYLVANIA
SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES

MEMBER AERA 1930

Westinghouse

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The list grows longer - -

ONE after another electric railway companies, large and small the country over, continue to place their names upon the roster of users of Westinghouse-Nuttall quiet gears.

The intense interest which has followed this revolutionary improvement since its introduction scarcely two years ago, is reflected in the fact that at present more than 30 properties have specified these gears both for replacements and as part of new equipment. Among these are many of the largest orders for new cars placed during the past year.

Such ever-increasing use of Westinghouse-Nuttall quiet gears is a significant indorsement of their importance as a fundamental requirement wherever quiet car operation is to be secured.

The Westinghouse-Nuttall noise-eliminating feature may be applied to either helical or spur gears.

The nearest Westinghouse transportation representative gladly will give you details.

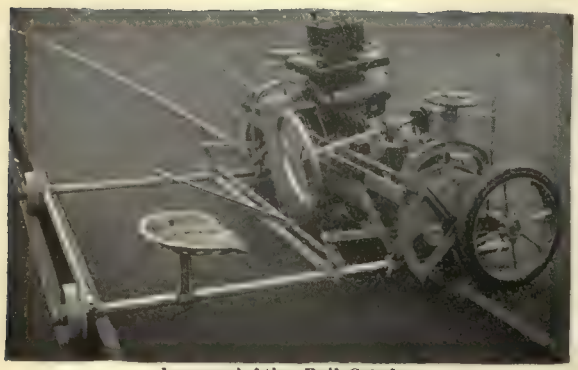
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NUTTALL WORKS PITTSBURGH, PA.

SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES
CANADIAN AGENTS: LYMAN TUBL AND SUPPLY COMPANY

MEMBER ELECTRIC RAILWAY ASSOCIATION AERA 1930

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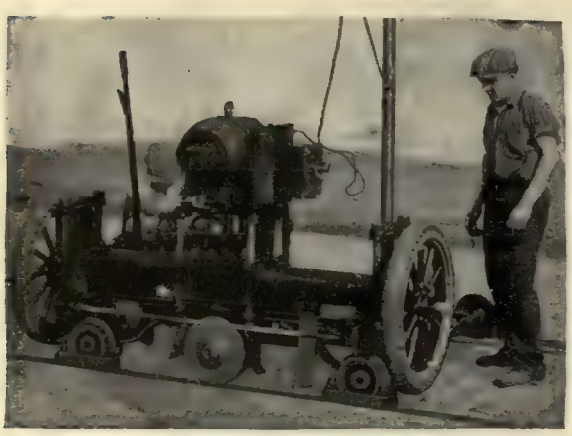
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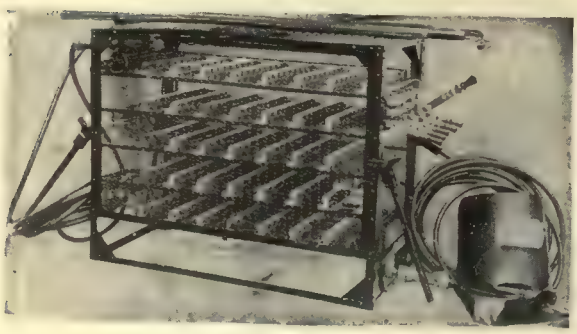
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

For a prosperous year

Money can't buy everything—unless you have a lot of it, but you don't need much money to have some very worth-while things... smooth track, for instance. And, that as most street railway men now know, is the very foundation of good service.

Only good track makes new cars act their age and old cars hide theirs.

You can't harvest a bumper crop of fares on bumpy track.

You can tell your public how good you are, but you can't sell them if your track refutes your words.

Good track, worth so much, costs so little if you'll only use modern track grinding and electric arc-welding equipment.

Here it is—
yours for a prosperous year

Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia

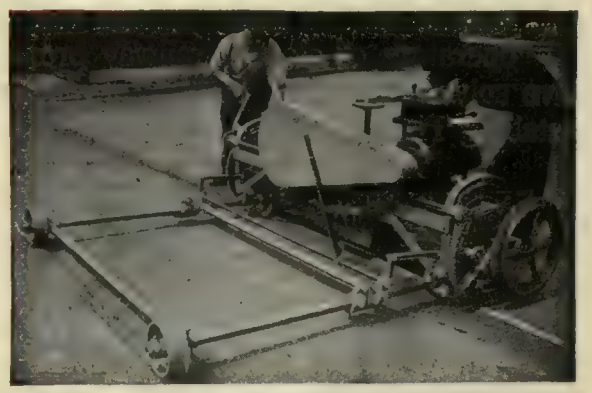
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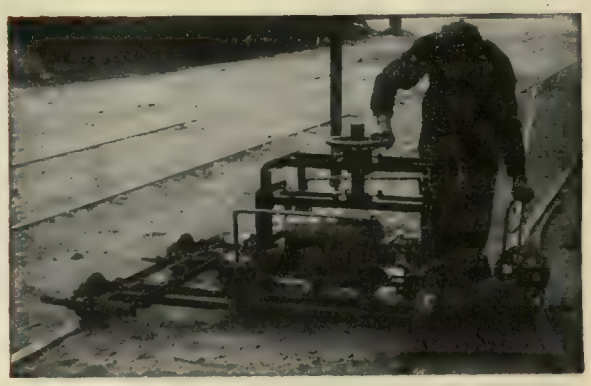
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Reciprocating Track Grinder



Vulcan Rail Grinder



Midget Rail Grinder



RTW Curve Oiler

How Over 125 Electric Railways Secure Efficient Rail Bonding

O-B Titon Bonds, Installed with Duron Welding Rod, Improve Reliability of Return Circuit.

FROM coast to coast, from Canada to Mexico and in many foreign countries, operators of electric railway properties have solved many rail bonding problems by installing Titon Bonds.

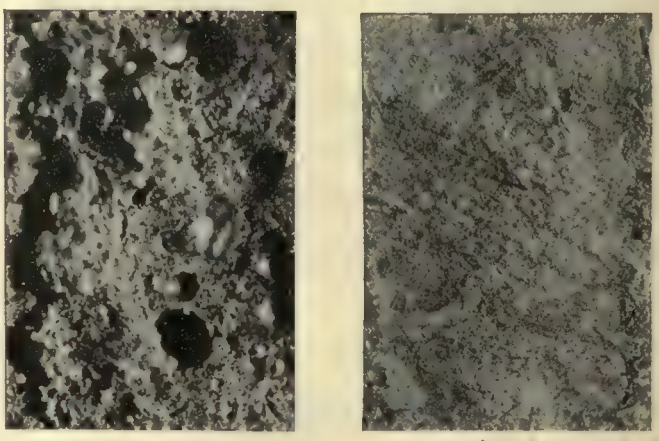


The O-B Titon Bond, for installation on ball of rail, over standard joint plates. Observe how the cupped terminal holds the welding material while in a molten state, thus assuring complete union between cable and rail.

In the few short years since Titons were first offered to the industry, experience shows a marked reduction in maintenance and replacements, with vastly improved efficiency due to the longer life and permanently lower resistance possible with *properly-installed* Titon Bonds.

Proper installation requires, in addition to a bond of correct design, a welding rod of definite characteristics. A dense weld, free from gas bubbles, which form a homogeneous union with the rail, is absolutely necessary to long life and low resistance.

The use of O-B Duron Welding Rod provides such a weld. Compare the above microphotographs of sheared sections. Why the weld made with O-B Duron Rod will and does render far better service than is possible



Microphotographs of welds sheared from rail. At the left is a weld made with ordinary scrap copper wire. Note the porosity and poor union with the rail. The weld at the right, made with O-B Duron Welding Rod is dense, free from porosity and makes a homogeneous union with the rail.

with less efficient material is obvious to the critical eye. A resistance welder, with negative rail polarity is used.

The service rendered by O-B Titon Rail Bonds throughout the industry is definite proof that this design, regardless of the welding material, is greatly improving performance. With the use of O-B Duron Welding Rod even this improved performance is bettered.



The O-B Hevi-Bede Titon Rail Bond for installation on ball of the rail, where heavily beaded or Weber type joints are used.

If you, too, have rail bond problems—if you want lower return circuit resistance, greater reliability and much longer life, why not investigate O-B Titon Rail Bonds?

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1180B

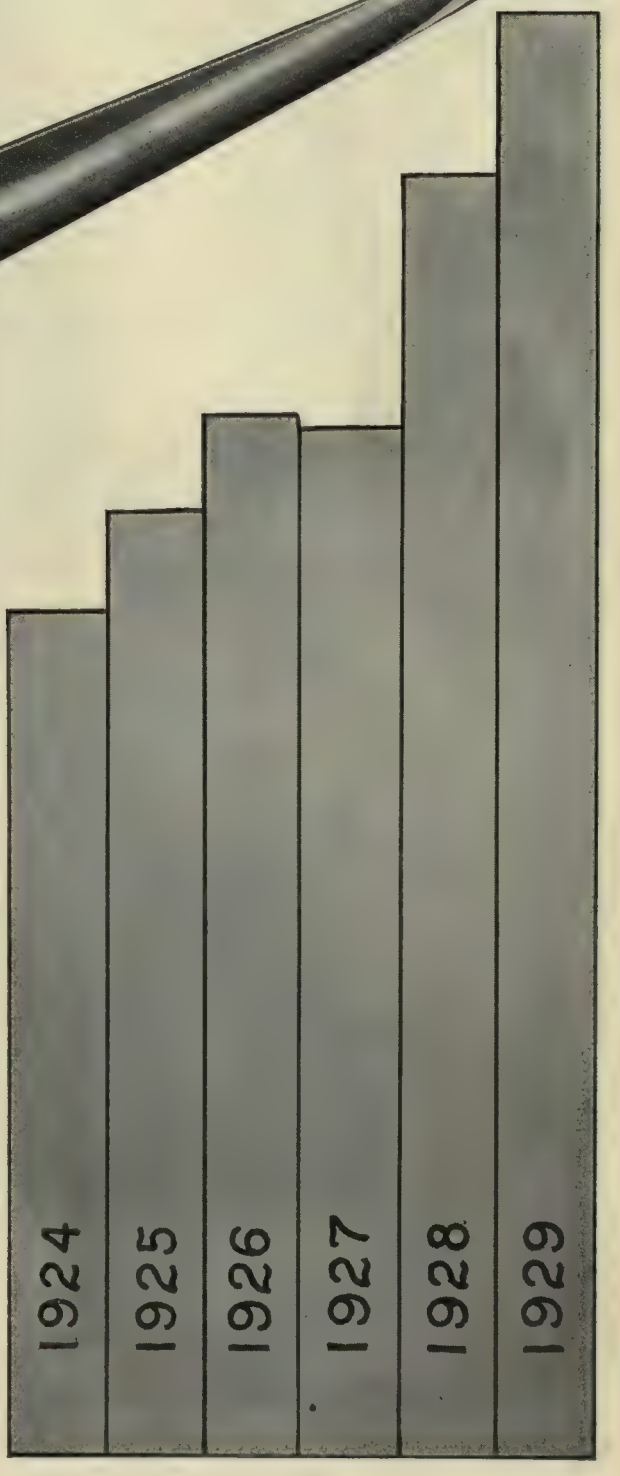
Ohio Brass Co.

NEW YORK PITTSBURGH PHILADELPHIA BOSTON CHICAGO CLEVELAND ST. LOUIS ATLANTA SAN FRANCISCO LOS ANGELES DALLAS

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

A Buying Record that Service is Building for MARATHON EARS





IN 1924 O-B Marathon Ears were first offered to the electric railway industry. Service tests, at that time, showed that more than double the mileage of other types could be expected. That there was a definite need for such an improved ear is indicated by the fact that during that first year, enough O-B Marathon Ears were purchased to take care of nearly 5,000 miles of wire.

From the beginning, the industry proved to itself that double mileage was the rule with O-B Marathon Ears—that 400,000 and more car passes were not unusual. Records on one property showed as high as 700,000.

As a result, year by year, more and more overhead superintendents have learned of and have chosen O-B Marathon Ears. And it is a significant fact that 1929 shows a continuation of this progress, as evidenced by a 12% increase over 1928; a 75% increase over 1924.

Certainly extraordinary service must be the reason. If you are not now using O-B Marathon Ears, may we suggest that you investigate this long lived, time and money saving device for your 1930 ear requirements?

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
11701

Ohio Brass Co.

NEW YORK PITTSBURGH PHILADELPHIA BOSTON CHICAGO CLEVELAND ST. LOUIS ATLANTA SAN FRANCISCO LOS ANGELES DALLAS

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LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES



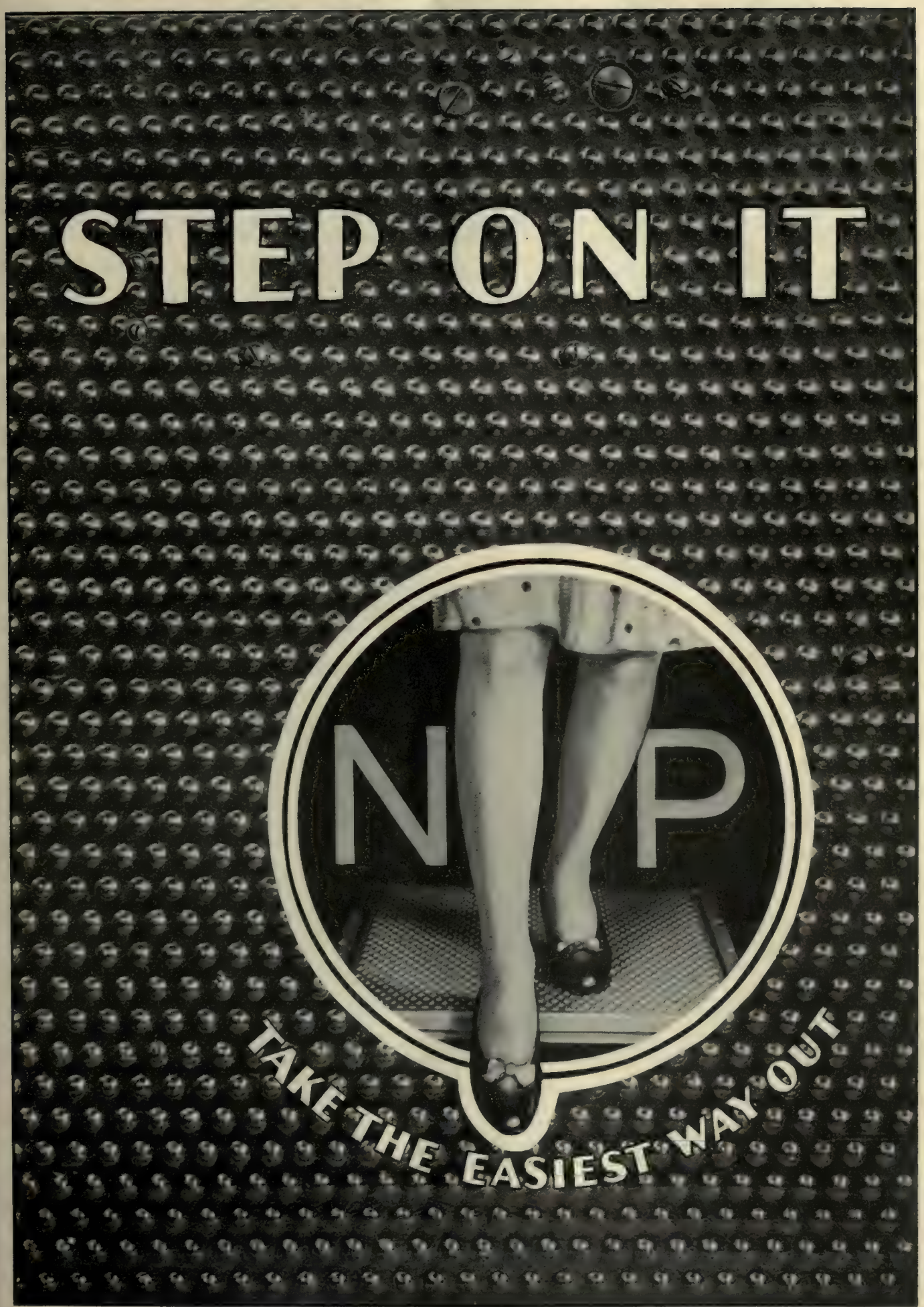
Do you have *your* copy?

YOU have, no doubt, been following our series of advertisements dealing with the seven factors that influence stopping distance. . . . The interest manifested in this series by street railway men throughout the country has indicated an eagerness for better brake performance. . . . These advertisements have now been reprinted in booklet form for ready reference and connected study by those interested. If you have not already received a copy, write for one now. Ask for Publication 9073.

Remember, also, that our engineers are always available for assistance in solving your braking problems.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works . . . WILMERDING, PA.


STEP ON IT
N P
TAKE THE EASIEST WAY OUT

J-M Brake Blocks are making unusual performance records on Bus Lines . . .

MORE than 650,000 safe, quick, quiet stops is an unbelievable record for any braking material. Yet the J-M Brake Blocks shown in the photograph below made this record in 25,000 miles of service . . . and this set of blocks is still good for thousands of miles additional cost-free braking service.

This is not an isolated record of the money-saving, safe service that J-M Brake Blocks give the bus operator. More than sixty companies have tested this friction material with uniformly successful results.

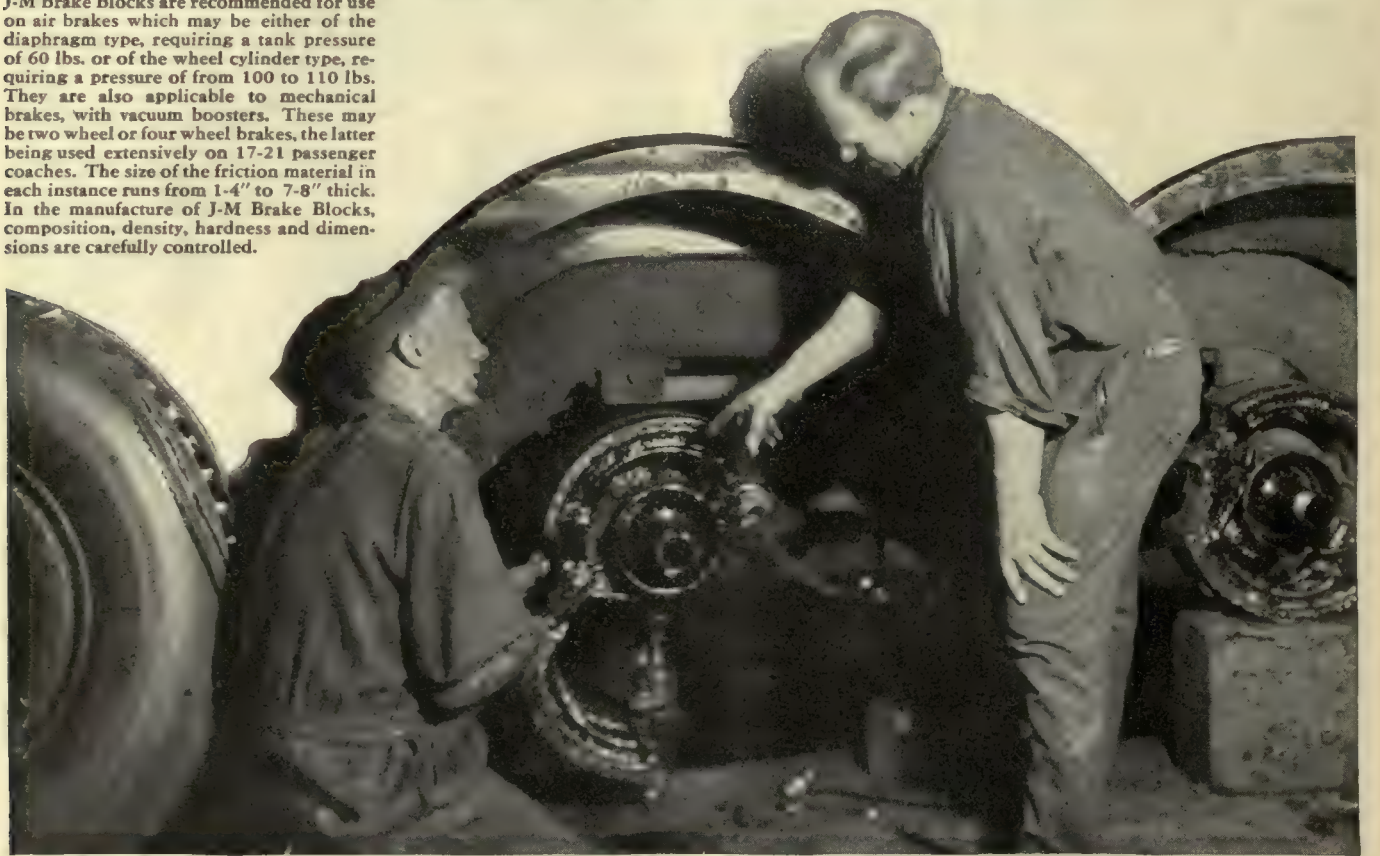
J-M Brake Blocks, adaptable to many types of equipment, have been specially designed to meet the operating conditions of modern bus service.

J-M Brake Blocks, made of moulded asbestos, resist the action of oils and greases. They reduce costs by giving thousands of miles of extra service, by reducing shop time for adjustments, by increasing tire life through smooth gripping and by eliminating road delays. J-M Brake Blocks provide quiet and positive braking action. They allow higher running speeds and quicker stopping with absolute safety. They are particularly recommended for use on alloy or high-carbon drums.

From the standpoint of safety, efficiency and reduced cost of operation we ask that you test this J-M friction material. The coupon will bring you further information and performance facts.

J-M BRAKE BLOCKS
FOR BUSES AND TRUCKS

J-M Brake Blocks are recommended for use on air brakes which may be either of the diaphragm type, requiring a tank pressure of 60 lbs. or of the wheel cylinder type, requiring a pressure of from 100 to 110 lbs. They are also applicable to mechanical brakes, with vacuum boosters. These may be two wheel or four wheel brakes, the latter being used extensively on 17-21 passenger coaches. The size of the friction material in each instance runs from 1-4″ to 7-8″ thick. In the manufacture of J-M Brake Blocks, composition, density, hardness and dimensions are carefully controlled.



BUS & CAR INSULATION REFRACTORY & INSULATING CEMENTS FIBRE CONDUIT ASBESTOS EXHAUST PIPE COVERING ASBESTOS SHINGLES
PACKINGS TRANSITE BUILT-UP & READY-TO-LAY ROOFING ASPHALT PLANK TILE FLOORING POWER PLANT INSULATIONS
MASTICOKE & TRUSS PLATE FLOORING ELECTRICAL INSULATING MATERIALS FRICTION TAPE BRAKE BLOCKS & LININGS

Johns-Manville
SERVICE TO BUS TRANSPORTATION

JOHNS-MANVILLE CORPORATION
Address our office nearest you
New York Chicago Cleveland San Francisco Montreal
(*Branches in all large cities*)

Please send me further information about your Brake Blocks.

Name.....

Address.....

SB-115-1



Look for Comfort



ONE has only to look around with a penetrating eye to know that comfort is being sold.

How does the successful hotel attract steady patronage? Why are theatres so luxurious? What appeals most to people when riding in motor cars? Why has deeply upholstered furniture displaced the old-fashioned straight back chair and haircloth sofa.





The answer is "comfort." People look for comfort. They pay to be comfortable. It pays to make them comfortable.

Comfort is a commodity that is building increased patronage for many a progressive railway. The foundation of riding comfort is a seat that is really restful.



HALE & KILBURN SEATS

"A BETTER SEAT FOR EVERY TYPE OF MODERN TRANSPORTATION"

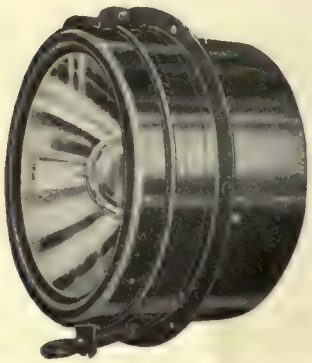
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Time Tested and . .



Golden Glow Railway Car Headlights



Golden Glow Bus Headlights



Dome Type A Keystone-Ivanhoe Fixture



Keystone Trolley Catchers



Type 129 Hunter Sign—mechanism



Type T Lighting Fixtures



Typical Hunter Illuminated Sign



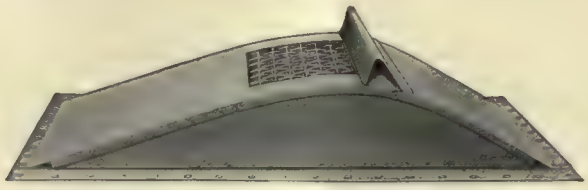
Faraday Push Buttons



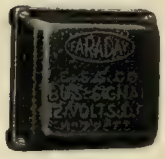
Dome Type S Keystone-Ivanhoe Fixture



Faraday Car Signal Systems



Keystone Roof Type Bus Ventilator



Faraday Buzzers

ELECTRIC SERVI

Home office and manufacturing plant located at 17th and Cambria Streets, Philadelphia, Pa.; District offices are located at 111 North Canal Street, Chicago, Ill. and 50 Church Street, New York City.

Constantly Improved

KEYSTONE EQUIPMENT

for cars and buses

Long experience in meeting the needs of Electric Railway Transportation Companies since the infancy of the industry enables us to serve you as *specialists* in car equipment unsurpassed in design, material and workmanship.

These long years of experience in manufacturing electrical equipment have prepared us to meet the needs of the latest development in mass transportation—the modern bus.

For Car Equipment—*Refer to Catalog No. 7.*

For Bus Equipment—*Refer to Catalog No. 9.*

CE SUPPLIES CO.

Branches—Bessemer Bldg., Pittsburgh; 88 Broad Street, Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents—Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

A Review of Recent



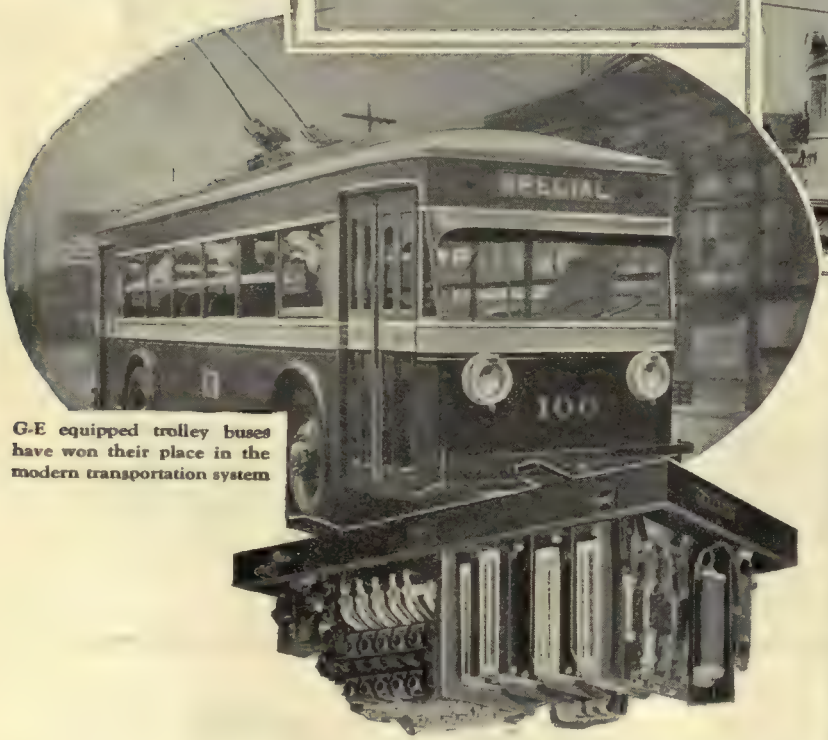
(Above) The Chicago Surface Lines specified PCM control and G-E air brakes for 100 new cars. Forty are equipped with GE-301, low-wheel motors



(Left) G-E motors, PCM control, and G-E magnetic brakes are responsible for the unusual performance of this car, operated by the Traction Co., Albany, N. Y.

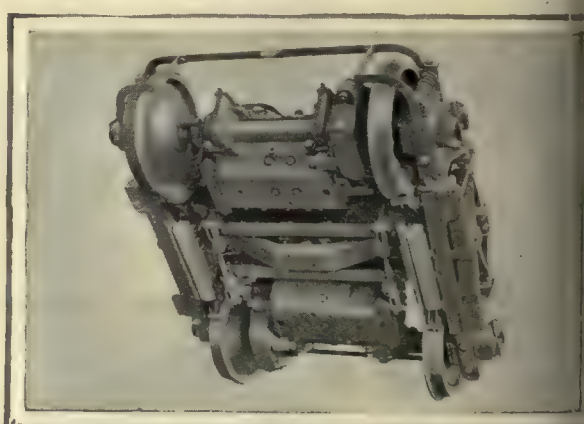


(Above) The Gary Railway Company of Gary, Ind., operates G-E equipped street cars. Several are of this modern type



G-E equipped trolley buses have won their place in the modern transportation system

PCM control provides smooth, quick acceleration. It is simple, compact, and reliable

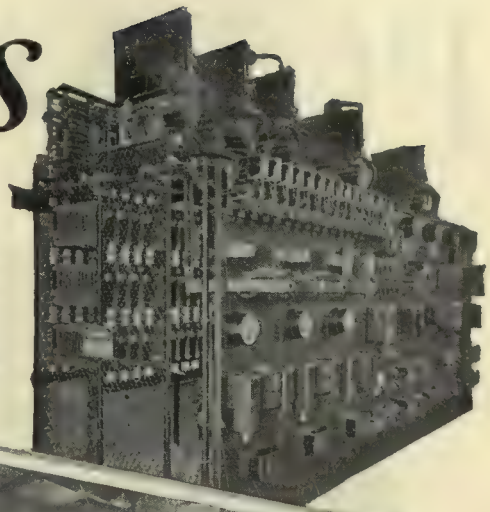


(Above) G-E magnetic track brakes are designed to prevent accidents

GENERAL

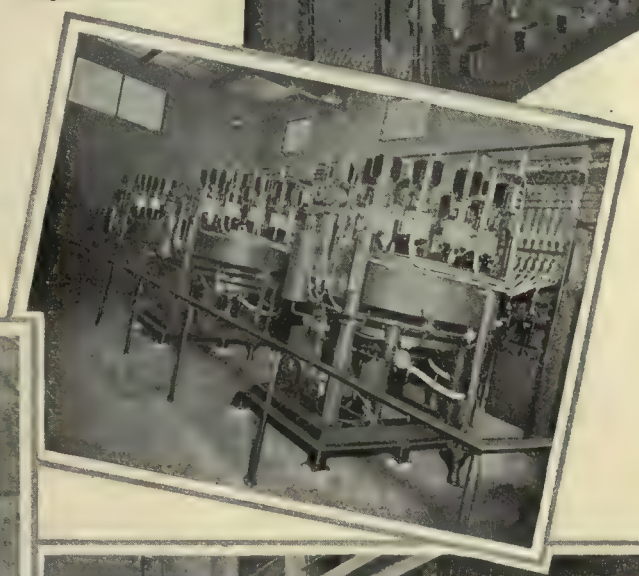
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

Developments



(Right) Automatic switching equipment for mercury-arc rectifiers, Piedmont and Northern Railway

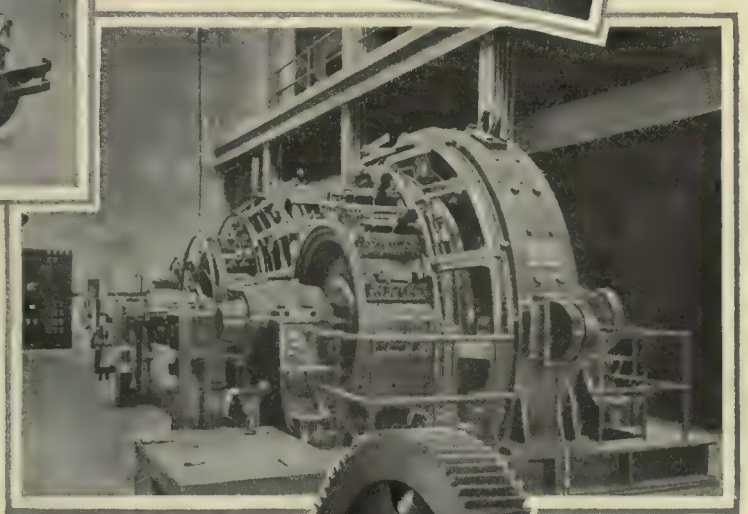
(Below) 1,000-kw., 600-volt, mercury-arc rectifiers, Philadelphia Rapid Transit Co.



[N recent years, the necessity of realizing every possible economy in operation and maintenance has become increasingly important. Now—more than ever before—the railway industry has opportunities, through the use of General Electric equipment, to effect sound economies and also to provide better service for the public.



(Above) The Public Service Coördinated Transport of New Jersey now operates more than 1,000 G-E equipped gas-electric buses



(Above) One 4,000-kw. and two 2,000-kw., 650-volt, manually controlled, synchronous-converter units, Brooklyn-Manhattan Transit Corp.



(Left) G-E line-material products include overhead equipment for trolley-bus operation



(Left) The G-E non-resonant gear contributes much toward quiet car operation

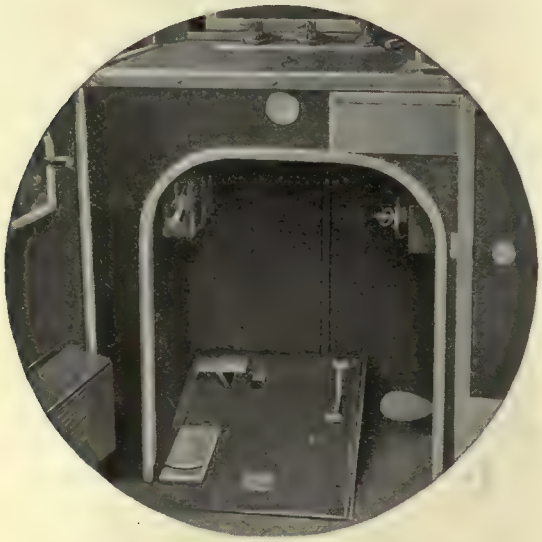
330-141

ELECTRIC

SALES OFFICES IN PRINCIPAL CITIES

POWER →

TO START TO STOP



Foot-operated control for the one-man car

SPEED, with safety, and comfort characterize this new G-E equipped car operated by the United Traction Company of Albany, N. Y. It is powered with four GE-265 motors (35 hp. each); it has a free running speed of 32 miles per hour at 550 volts. A smooth, quick acceleration (3½ mi. per hr. per sec.) is obtained with foot-operated PCM control, the operator selecting his desired running speed by means of a pedal instead of the usual hand controller. Two sets of brakes—G-E air brakes and the new G-E magnetic track brakes, both foot-operated—provide the utmost safety regardless of rail conditions. This equipment makes possible an emergency braking rate of from 6 to 8 mi. per hr. per sec.

This car permits an increase of 15 per cent in schedule speed. Such all-round performance attracts patronage and reduces operating costs. For complete information, address the General Electric Company, Schenectady, N.Y. or the G-E sales office nearest you.



The magnetic track brakes are located between the wheels, next to the track

330-142

GENERAL ELECTRIC

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 74 New York, January, 1930 *Number* 1

Accelerated Progress

FORECAST BY RECORD OF PAST YEAR

FIRM FAITH in the future is shown by the intention of the electric railways to spend almost $375,000,000 during the next twelve months for extensions, betterments and maintenance. Building slowly but surely on a firm foundation, the industry has steadily improved its position in recent years until today it looks forward with renewed confidence. Figures received by this paper from companies representing more than 97 per cent of the electrified track mileage of the United States and Canada show that the record of 1929 is more encouraging in nearly every way than the record of any other recent year. Estimates for 1930 indicate that even greater progress may be expected during the year just beginning.

Operating Results Improved

FINANCIAL results of operations in 1929 were notably better than in 1928. The total number of passengers carried by the cars and buses of the electric railways last year was slightly greater than during the preceding year. The average fare increased a fraction of a cent. Gross earnings showed a moderate gain. On the other hand, wages and construction costs remained fairly steady, and more efficient operation permitted a substantial reduction in expenses. As a result, net income was considerably improved. Apparently the recent disturbance in the stock market has had little, if any, harmful effect upon the electric railways. Despite some uncertainty concerning the general business outlook, indications are that revenue will be as good in 1930 as in 1929, or perhaps slightly better, and that operating expenses may be still further reduced.

Budget Figures Show Gain

EXPENDITURES made during 1929 for new plant and equipment, maintenance materials and supplies, and construction and maintenance labor, totaled more than $355,000,000. This total is about 4 per cent higher than the figure of similar expenditures made during the preceding year, and is slightly more than was forecast by this paper last January.

Estimates for expenditures during 1930 reflect clearly a recognition of the continuing need for rail service. An increase of $3,000,000, is indicated in expenditures for new cars, making a total of about $32,000,000. Way and structures expenditures will be increased $7,000,000 to a total of more than $88,000,000, not including the cost of regular maintenance work. The power and line budget shows a similar but somewhat smaller increase. At the same time continued expansion of bus operation is forecast by expenditures of some $20,000,000 estimated under that heading.

Rolling Stock Purchases Increased

APPROXIMATELY 1,400 cars were bought by the electric railways in 1929 as compared with less than 900 in 1928. Cars designed for carrying heavy loads in the larger

cities pre-dominated in the purchases last year, but it is notable that a considerable number of companies operating in the smaller cities are also found in the list of purchasers. Included in the total is one order for 300 rapid transit cars for New York City and several orders totaling more than 200 cars for multiple-unit operation in electrified suburban service. One hundred trail freight cars were bought by the electric railway industry, and 77 electric locomotives. Moreover, some 2,300 old cars were scrapped during the year.

Bus Operations Expanded

THE number of new buses bought last year was even larger than the number of new cars, being over 1,800. At the same time nearly 400 additional buses were acquired through the purchase by the railways of independent lines already in operation, making a total gain of about 2,200 buses. This increase is only a little less than that which occurred in 1928, a year of notable expansion in the bus operations of the electric railways. Some 700 buses were scrapped or otherwise disposed of. It is interesting to note that this is equivalent to 70 per cent of the number of buses bought by the electric railways five years ago. Extensions to existing bus routes and new routes added during 1929 totaled nearly 4,000 miles, a considerably larger increase than occurred during the preceding year.

Particularly significant is the increase in the number of trackless trolleys operated by the electric railways. After a promising beginning about ten years ago this type of transportation waned in popularity until it appeared to be on the verge of disappearing entirely. More recently, however, important improvements in the design of the vehicle have restored it to favor. While it is too early as yet to prophesy how far the adoption of trackless trolleys is likely to go in the future, it is evident that this type of vehicle has promising possibilities for rendering efficient transportation service under the conditions to which it is suited.

Volume of Trackwork Large

EXTENSIONS and reconstruction of electrified tracks totaled over 1,050 miles last year. Of this amount more than 850 miles represented increases and improvements to the trackage of the urban and interurban electric railways, and some 200 miles represented electrification of lines formerly operated by steam. While these figures show a slight decrease from the corresponding figures for 1928, they are considerably above the average for the past ten years.

Coincident with the additions made to the trackage and equipment of the electric railways, certain decreases also have occurred. Considerable track was abandoned during the year just ended, the total being approximately 1,000 miles. This is substantially less than the mileage of abandonments which occurred in 1928. Moreover, there was a marked reduction in the number and mileage of properties that were entirely abandoned.

Partial abandonments by companies which continued rail operation on other routes constituted by far the larger part of the decrease in mileage which occurred last year. From this it is evident that real progress is being made in co-ordination, rail service being retained where it is justified by the relationship between revenue and expense, and bus service being instituted in its place where conditions are more favorable for that type of operation.

Industry Strengthened By Readjustment

AS A NET result of these changes the electric railways find themselves at the beginning of the new year with a slightly reduced mileage of track, and a slightly smaller number of cars, but with a substantially larger number of buses and mileage of bus routes. Without doubt, this readjustment has greatly strengthened the position of the industry by enabling it more effectively to meet the transportation demands of the traveling public. That further readjustment along similar lines will occur during 1930 appears certain. From this it is not to be inferred, however, that wholesale substitution of buses for cars is in prospect. Substitutions will continue to be made where they appear to be advantageous, but the necessity for rail service on heavy traffic lines is steadily becoming more widely recognized.

These facts furnish convincing evidence that the industry is in a fundamentally sound condition. Notable progress was made during the year just ended and every indication points to an even greater advance in the year now beginning.

Electric Railway Industry in More

Favorable Position

With revenues approximately the same as in the previous year, the companies have been able to make readjustments for reduced operating expenses, making the net revenue for 1929 the largest in the history of the industry. Statistics show the progress made over a period of years

WITH another year added to the record, the electric railway industry is found in a more stable position than it has been in for some time. It has continued during 1929 along lines similar to those followed in the previous year. The results of a number of influences that have been at work for some time are, however, only beginning to make themselves apparent, so that the industry has been able to make readjustment to the end that greater net revenues have been obtained. The increase in the number of automobiles used for private, urban and suburban transportation has continued at a pace only slightly retarded from its maximum of a few years ago. Even with this the revenues of the electric railways have held up. At the same time it has been found possible to introduce economies, some of them of a major character, so that expenses have not increased. As a result of these two trends acting together, the net income of the electric railway properties for the year, according to the preliminary estimates now available, actually will be the highest the industry has known.

Financial results for the past year's operations, shown graphically on the right edge of Fig. 1, may be compared at a glance with those of past years. This chart, which has been prepared with the assistance of the American Electric Railway Association, shows the financial history of the industry since 1907. The figures for the years 1907 to 1922, inclusive, are from the United States census of street and electric railways, and the others are from the association's records. Inspection of the chart shows that from a net income in 1907 of $40,000,000 retained out of gross revenues of $430,000,000, the business done by the electric railway properties has expanded so that last year the net earned was approximately $83,000,000 out of total revenues amounting to slightly less than $1,130,000,000. On a per cent basis the return has diminished considerably, the net income being 9.4 per cent of the gross in 1907 and only 7.4 per cent in 1929. However, the net income has been increasing steadily each year since 1924, when it was only 4.2 per cent of the gross. This change is of immense importance when the status of the industry as a going concern is under consideration. It is reflected in the improved standing of electric railways with financial interests generally. The approximate figures for the distribution of the expenses for the past year are: wages $424,000,000; other operating expenses,

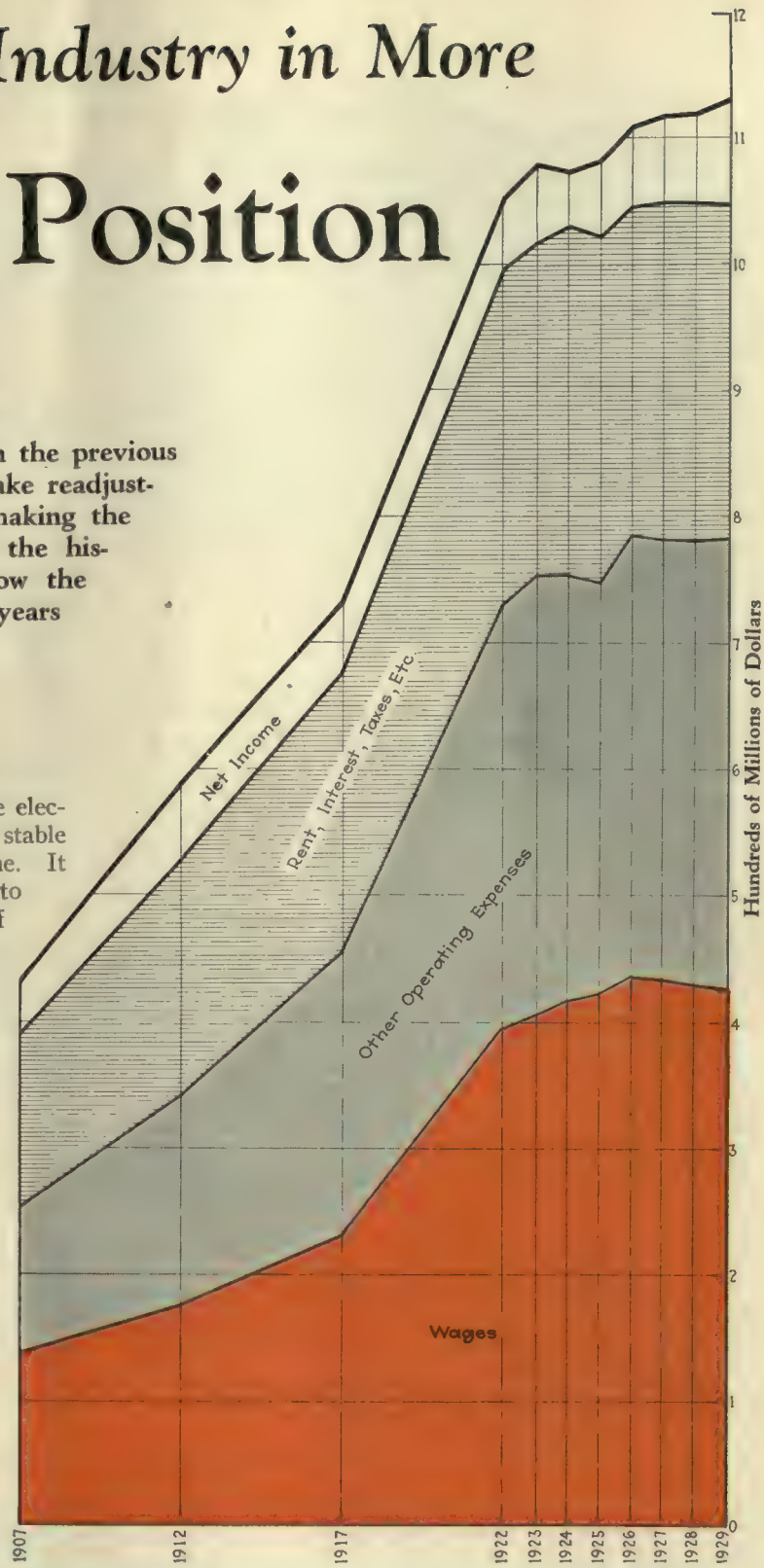


Fig. 1—Distribution of revenues of electric railways of the United States
Figures for 1907, 1912, 1917 and 1922 are from the U. S. Census, and for other years from data collected and compiled by the American Electric Railway Association.

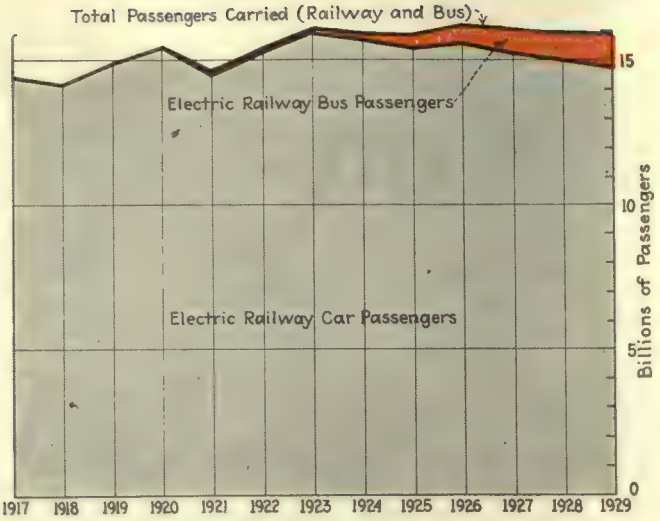


Fig. 2—Total annual passengers of United States electric railways and their bus subsidiaries

Compiled from U. S. Census figures for 1917 and 1922 and from A.E.R.A. data for other years.

$357,000,000; rents, taxes, interest and similar charges, $264,000,000. Wages thus represent 37.6 per cent of the total revenue. Other operating expenses are 31.6 per cent, and rents, interest, etc., are 23.4 per cent of the gross revenue. The ratio of operating expenses to gross revenue stood at 69.2 per cent, which is less than the operating ratio in any recent year.

Passenger Traffic Almost Constant

In number of passengers carried the industry has shown but little change from year to year for some time. In a number of the smaller communities there has been a reduction in riding on street cars, but this has been balanced to a large extent by an increase in the riders on buses operated by the street railway interests. In some of the larger cities there has been a gain in both car and bus passengers. Fig. 2 shows the total number of passengers carried on the vehicles operated by the electric railway companies from 1917 on, separated into car and bus riders. In this chart the figures for electric railway passenger traffic are based on the 1917 and 1922 United States censuses of electric railways, while those for other years are estimates of the American Electric Railway Association. The total number of passengers carried in 1929 was approximately 15,830,000,000, of which 14,740,000,000 were car passengers and the remaining 1,090,000,000 were bus riders.

Miles of Route Covered Expanded Greatly in Ten Years

The track mileage and mileage of bus routes operated by electric railway companies are shown graphically in Fig. 3. During the period from 1917 down to the present there has been an increase of enormous proportions in the length of streets, highways and private rights-of-way over which street and electric railway cars and buses are run. The chart shows that in 1918 there were some 45,000 miles of electric railway tracks and 2,630 miles of electrified steam railroad in the United States. At that time there were no bus routes, and none were recorded until 1920, when there were about 1,000 miles. From year to year there have been minor suspensions of service on tracks which were non-productive, or where buses could be used to replace the cars to advantage. These abandonments have been offset to some extent by extensions of track. In practically every instance where such extensions have been made they were justified economically, as it now is possible to use the bus for extensions of service into territory where there is uncertainty of the need for it. In a number of instances the necessity for maintaining track and rehabilitating it has disappeared, since it is possible to use buses to replace it to good advantage without continuing the liability for excessive taxation and paving charges which in the past have been assessed against the electric railway companies and have proved a severe handicap to successful operation. Where service is not too heavy this plan has proved advantageous.

In other instances abandonment of track has resulted from the need for more direct routing. Many lines were laid out without regard to obtaining the most direct or fastest service, but were distorted to satisfy real estate operators and others who for one reason or another demanded a deviation from the best route. In such instances the bus has usually been accepted as a substitute over the route which best serves the patrons at the present time. The abnormal rise in construction costs without a corresponding rise in revenue caused a situation due to which some of the smaller railway companies were unable to survive the onslaught of much higher operating expenses without an adequate amount of traffic. Then, too, the advent of the private automobile took away sufficient traffic that certain lines became unremunerative.

It is a matter of common understanding that in the heyday of the promotion of electric railway lines 20 to 30 years ago many miles of track were constructed that never should have been built. The territory in which they were placed was not, and could not be, productive of sufficient traffic to warrant them. Although they were a drag on the system, the remainder brought in sufficient revenue to carry the loss. When the war came, bringing in its wake greatly increased costs of operation and maintenance, and when the number of passenger automobiles increased to a total undreamed of in the days

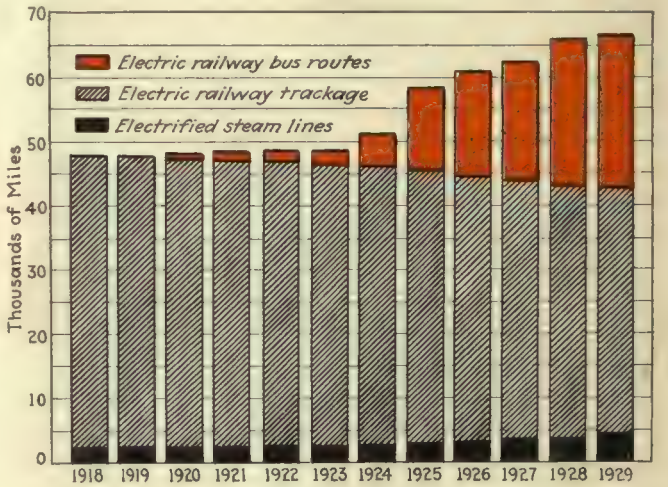


Fig. 3—Electric railway track and bus route mileage in the United States

Figures compiled by Electric Railway Journal.

of the promoters, all within the space of a few years, such unwarranted railway lines were wiped out. Some of them were replaced by bus lines, but in other instances no public transportation of any sort is now given. While the process has been going on for several years, it is not yet completed. There still is some rail-

way track that was uneconomically located at the beginning, and which is a drag on the more prosperous portions of the systems.

Little Change in Number of Vehicles but Capacity Increases

Despite the large numbers of cars and buses that are retired annually, there has been little change in the total number for the last several years. At present there are approximately 111,000 cars and buses in use in the United States, of which 73,768 are passenger cars and 11,854 are buses. The remainder are divided between electric locomotives, freight, service, and miscellaneous cars. It is noteworthy in this connection that the improvement in electric railway cars has made possible the retirement of large numbers of obsolete vehicles and their replacement by a smaller number of new, fast, light-weight cars that are operated today to give an increased number of car-miles. The buses likewise are vastly improved from those that were first introduced, so that comparisons of numbers alone do not give an adequate picture of the change that has been wrought in the past ten years or so. Fig. 4 merely indicates the increase in vehicles that has taken place from 1917 to the present time.

A measure of the actual service rendered by the industry is given in Fig. 5, which shows the vehicle-miles of the cars and buses operated by electric railway systems for the past thirteen years. More and more service is being rendered to the public year by year, as will be noted by a comparison of the vehicle-miles in this chart and the number of passengers carried in Fig. 2. When it is remembered that the modern cars and buses are larger, and not only have more seats but more standing room, the increase becomes even more noteworthy.

Traffic Holds Up Despite Unfavorable Industrial Situation

Another trend which may be noted with considerable interest is the relation between industrial employment and riding. During the four years shown in Fig. 6 there has been comparatively little change in the employment index, save for a relatively brief period in 1928. In the summer of that year the index fell to a low

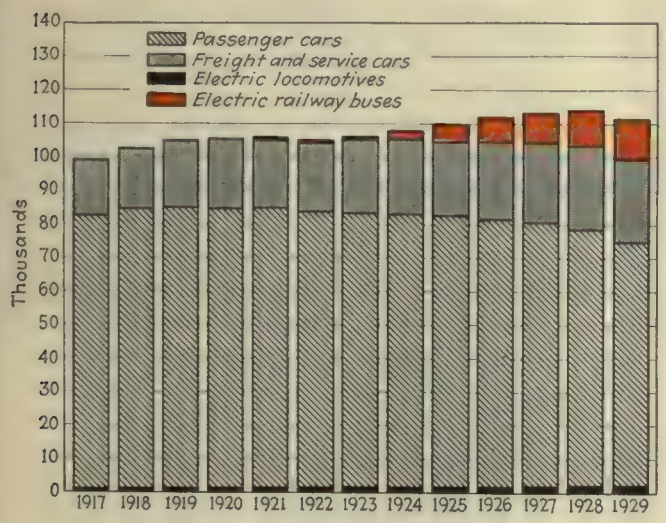


Fig. 4—Cars and buses of the electric railways of the United States
Figures compiled by Electric Railway Journal.

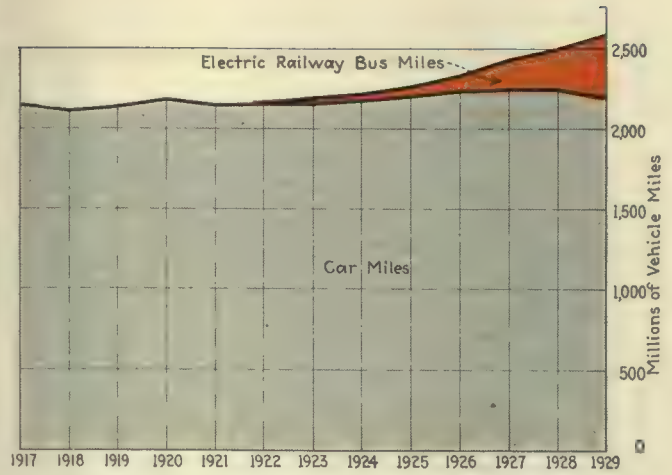


Fig. 5—Revenue vehicle-miles operated annually by United States electric railway systems
Car-miles for 1917 and 1922 from U. S. Census, for other years from A.E.R.A.

figure of 93.1, where it remained for two months, recovering to a present high of 98.5, as compared with 101.2 in the fall of 1926. Passenger traffic, on the contrary, has not followed this trend directly, if at all. It reached a high value of 101.43 in March, 1927, falling gradually and with minor fluctuations to 97.37, the index for October, 1929. There was no drop in riding corresponding with the low employment figure of 1928, and hence there was no corresponding rise during the present year with the improvement in the labor situation.

Undoubtedly a long period of depression would have a more marked effect on the riding habit. On the other hand, it probably would cause a reduction in the use of automobiles, as the operating cost of the motor vehicle would in that instance require a more careful analysis by its owner, who today is interested far more in its convenience as compared with public transportation. As there has been no such period of depression since the automobile has become a large factor in local transportation, the best estimates of what would happen in such an event are little more than guesses. It appears probable, judged by past depressions, that the loss of riding would be decidedly less than the reduction in employment, and under today's conditions there might even be an increase. That, however, is purely a matter of conjecture.

Automobile Affects Riding Less than Popularly Supposed

Many writers have laid all the ills of the transportation industry to the growth in use of the passenger automobile. Fig. 7 shows how far from the truth is the idea that the industry has received a death-blow from this source. The riding habit, or number of rides per capita, is the best measure available for the use made of transportation vehicles. In the period shown it has ranged between 101 and 116, the high figure being reached in 1923, which was the banner year for street car riding. Contrasted with this is the increase in the registration of automobiles, which has gone up from 35 per thousand of population in 1917 to 189 in the year just closed. Naturally it might be expected that the great increase in a new mode of transit would cause a reduction in riding on public vehicles so great that their operation, even in large cities, would be unprofitable. Instead, with a 50 per cent increase in registrations since 1923, the reduction in car and bus riding has been from

Statistics of City and Interurban Electric Railways and Electrified Steam Lines

(As of January 1, 1930)

	Number of Operating Companies	Miles of Track	Passenger Cars		Electric Locomotives	Freight Cars		Service Cars	Buses Operated	Miles of Bus Route
			Motor	Trailer		Motor	Trailer			
New England States										
Connecticut	8	1,290.51	1,395	105	146	54	8	214	217	542.90
Maine	12	422.93	321	8	7	25	69	94	5	25.00
Massachusetts	25	1,912.67	3,773	288	6	23	12	752	713	1,131.87
New Hampshire	11	125.03	172	0	2	0	1	30	41	71.48
Rhode Island	3	301.74	585	9	3	15	0	113	164	160.60
Vermont	4	20.10	7	0	3	2	1	3	23	32.20
Eastern States										
Delaware	1	70.02	113	0	0	0	0	15	22	47.49
District of Columbia	5	395.06	862	24	6	2	13	109	144	287.98
Maryland	5	667.75	1,277	156	3	28	95	148	231	1,602.14
New Jersey	13	1,164.16	2,679	100	0	5	0	327	2,458	3,184.75
New York	71	5,275.54	16,056	2,773	203	196	87	1,524	831	947.73
Pennsylvania	78	3,889.03	6,876	261	9	117	82	931	892	1,518.93
Virginia	13	677.30	684	61	16	10	7	82	247	171.43
West Virginia	10	635.34	365	0	19	25	28	54	128	642.05
Central States										
Illinois	49	3,245.18	6,327	975	80	88	2,787	766	463	1,371.73
Indiana	24	2,496.17	1,619	89	23	426	519	436	443	1,330.46
Iowa	23	984.32	614	43	39	13	1,036	193	150	1,089.18
Kentucky	7	495.49	731	71	0	24	0	126	84	77.21
Michigan	22	1,273.50	2,208	295	27	57	153	254	1,036	1,855.57
Minnesota	8	694.71	1,198	26	2	1	0	99	117	144.54
Missouri	14	1,152.26	2,281	186	5	14	22	338	179	248.56
Ohio	49	3,267.08	3,475	585	26	173	577	645	986	1,878.72
Wisconsin	15	767.03	1,199	54	8	8	4	42	310	1,471.92
Southern States										
Alabama	10	329.53	397	62	2	3	0	61	15	24.24
Arkansas	7	119.23	233	10	0	2	0	17	20	20.60
Florida	7	209.82	382	2	0	2	2	24	90	67.15
Georgia	7	370.42	535	21	2	8	10	44	69	45.39
Louisiana	8	285.65	787	47	0	2	0	78	61	72.76
Mississippi	7	24.00	35	0	0	0	0	3	56	35.20
North Carolina	8	321.97	205	10	17	4	159	40	60	39.02
South Carolina	4	60.16	72	0	0	3	0	9	9	32.70
Tennessee	9	455.01	593	53	3	2	1	71	49	366.04
Western States										
Arizona	3	24.46	33	0	0	3	0	3	13	22.98
California	26	3,464.55	4,093	229	103	67	2,953	428	592	1,410.41
Colorado	9	342.70	366	127	9	2	220	86	46	69.70
Idaho	1	0	0	0	0	0	0	0	11	17.00
Kansas	15	431.47	268	23	14	66	29	38	121	166.69
Montana	8	705.15	105	14	50	35	1,430	32	5	3.50
Nebraska	4	183.88	452	20	3	1	1	67	54	42.49
North Dakota	3	25.54	42	1	0	0	0	9	4	4.95
Oklahoma	11	378.84	231	27	19	83	67	34	140	177.79
Oregon	5	684.73	609	76	24	4	481	116	62	71.40
South Dakota	1	0	0	0	0	0	0	0	27	574.28
Texas	22	1,025.84	1,314	46	5	28	16	142	295	399.88
Utah	7	472.45	262	60	14	4	344	58	27	78.94
Washington	18	1,293.08	936	64	47	203	128	69	135	279.71
Wyoming	1	0	0	0	0	0	0	0	9	28.50
U. S. Total	671	42,431.40	66,767	7,001	945	1,828	11,342	8,724	11,854	23,885.76
U. S. Possessions	5	125.39	268	0	1	29	0	25	98	67.78
Canada	57	2,505.86	3,831	368	65	244	469	449	499	983.76
Grand Total	733*	45,062.65	70,866	7,369	1,011	2,101	11,811	9,198	12,451	24,937.30

*Includes 55 companies which now operate only buses.

FIGURES presented in this table are based on reports received by ELECTRIC RAILWAY JOURNAL during December, 1929, from companies representing more than 97 per cent of the total electrified track mileage of the United States and Canada, supplemented by reports previously received from other companies. The number of companies shown is the number of actual operating companies and does not include subsidiaries whose physical property has been absorbed by merger, etc., nor holding companies which do not operate under their own names. Track mileage and equipment data of interstate companies are listed according to the actual location of track. In addition to the number of cars shown in this table there are in the United States and Canada a total of 3,374 miscellaneous cars which have not been listed by states.

116 to 101. Furthermore, with the automobile registration standing at virtually one for every five people, little additional competition from this source is likely, and an increase in the riding habit on account of the difficulty of operating motor vehicles in the modern city may be looked for from now on.

Readjustment of Fares Has Been Gradual

While it is not possible to make a complete analysis of the fare situation in a review of this nature, the trend of fares in the past thirteen years can be seen clearly in Fig. 8. Before the war practically all the city companies had a basic 5-cent cash fare, frequently supplemented with reduced rate tickets. By 1917, when the chart begins, 271 out of the 297 companies included still had the 5-cent base charge. One had zone fares, 24 had 6-cent cash fares, and the remaining company 7 cents. In the next year many companies went to 6

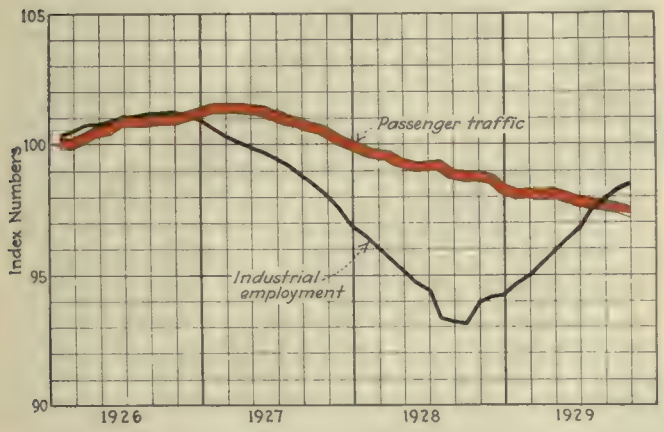


Fig. 6—Trends of passenger traffic and industrial employment in the United States

Passenger traffic is from data reported by 201 companies to the A.E.R.A., and the data on employment from the U. S. Bureau of Labor Statistics.

cents, several to 7 cents, and a few to 8 cents. The 10-cent cash fare appeared in 1919 and the 9-cent fare in 1920. In that year all but 64 of the companies had obtained a cash fare higher than 5 cents. The succeeding years have seen the growth of the 10-cent base rate and a still further reduction of the 5-cent fare, as at the end of 1929 only 33 companies retained the low rate. The 6-cent fare also has fallen from popularity, being confined to 13 properties. Seven cents is charged on 56 systems, 8 cents on 44, 9 cents on only one and 10 cents on 126, while zone fares are in use on 24 systems. Attention should be called to the fact that reduced rate fares of one form or another are in use on a considerable number of the companies included in the chart, which would reduce the average fare considerably. On the contrary, no bus fares are included. Since in the majority of instances the bus fares are higher than the street car fares the number of higher rate companies would be augmented if they were included.

Industry Statistics Presented

Statistics of the industry have been compiled by this paper, and are presented in the table on page 6. The figures have been obtained from a canvass of the individual companies, supplemented by information previously published in the McGraw Electric Railway Directory. The new information, however, covers more

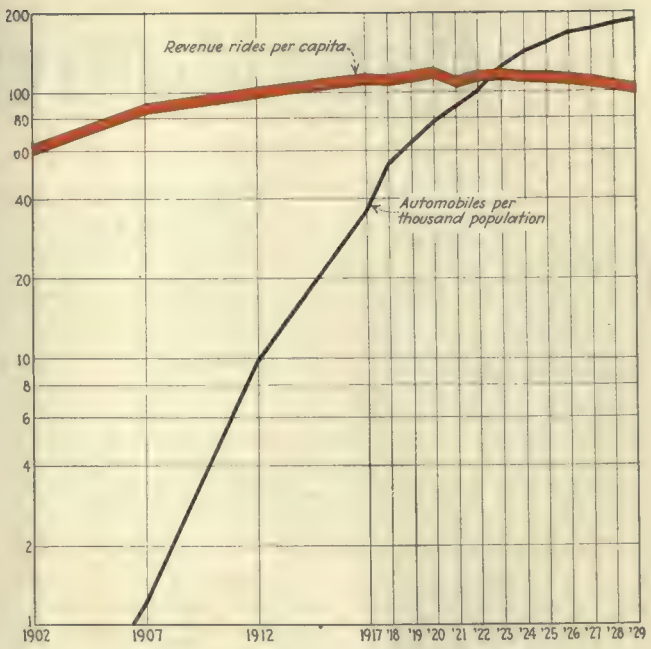


Fig. 7—Effect of private automobiles on passenger transportation in the United States

Electric railway traffic figures for 1917 and 1922 are from the U. S. Census, the remainder are A.E.R.A. estimates. The passenger automobile registrations are supplied by the National Automobile Chamber of Commerce.

than 97 per cent of the systems of the United States and Canada. It may be accepted as the best available information extant.

At the beginning of this year there are 671 operating electric railways in the United States. They have 42,431 miles of track and approximately 24,000 miles of bus routes. The number of cars owned includes 73,768 passenger cars, 945 electric locomotives, 13,170 freight cars, and about 12,000 service and miscellaneous cars. In addition these companies or their subsidiaries own nearly 12,000 buses.

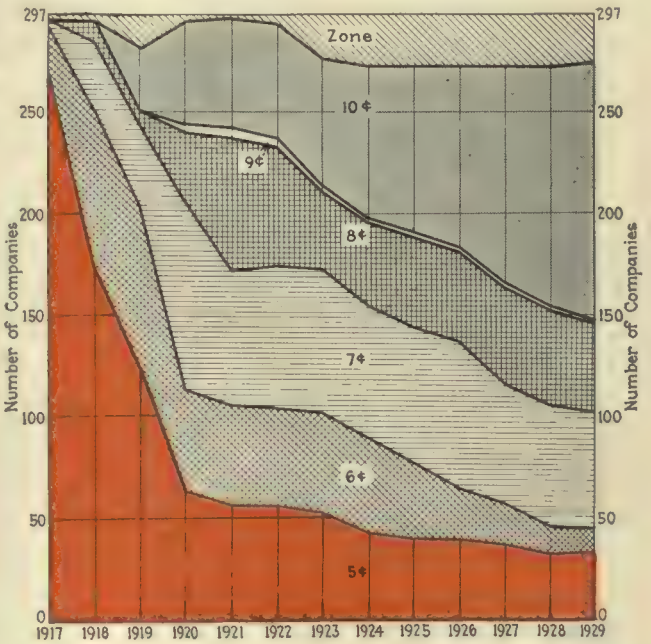


Fig. 8—Distribution and trend of fares of electric railways

Based on 297 companies operating in 280 cities of the United States having a population of 25,000 or more, as reported to the American Electric Railway Association.

Expenditures for Improvements

Budget increase in 1929 exceeded that of 1928, reflecting continued betterment of railways' financial condition. Rolling stock expenditures show greatest increase. Both maintenance material and labor totals rise. Estimates for 1930 forecast further increases.

CONTINUING the upward climb which started in the year of 1928, following the low ebb of 1927, the total expenditures for new plant and equipment and maintenance materials in the electric railway industry in 1929 again exceeded those for the preceding year. Moreover, it is noteworthy that the expenditures of 1930 will exceed those of 1929 by an even greater margin. During the years 1925, 1926 and 1927 the totals receded steadily. The figure for 1927, however, represented a smaller decrease than attended the previous figures and it was predicted at the time that the next year would show a slight increase and the following years slightly greater increases. This trend has been borne out, not only for 1928 and again for 1929, but also in the forecast for the new year, 1930. From $225,271,000 for 1927 to $225,730,000 in 1928 and to $236,005,000 for 1929 are the actual figures. $459,000 and $10,275,000 are the increases for the respective years. Budgets for 1930 submitted by the electric railways indicate that the total will soar to $251,530,000, representing an increase of $15,525,000 or 6.58 per cent.

In view of the somewhat disturbed condition of general business brought about by the recent market crash, the figures of 1929 and the forecast of 1930, both showing increases, are of real significance. They emphasize again the fundamental stability of the electric railway industry and its relative immunity to fluctuations in trade. Expenditures for the past year were not curtailed in any instance and most of the electric railways reporting showed increases for 1930. In a survey made by the American Electric Railway Association for President Hoover the railways reported the same plans. It was stated in the association's announcement, following the survey that the railways would spend more than $1,000,000 a day for equipment and various construction activities in 1930. Actual figures show that the total amount will be $371,220,000, representing $149,050,000 for new plant and equipment, $102,480,000 for maintenance materials and $119,690,000 for maintenance labor.

As mentioned in the interpretation of the budget figures last year, the electric railways had been planning extensive improvement programs for some time, but hesitated in carrying them through because of trifling uncertainties. With the great improvements in car design of the past few years and the reassurance that local transportation cannot be dispensed with, many properties have gone ahead with rehabilitation plans. It was stated last year that the purchasing power of the industry was rapidly being restored and that a steady climb could reasonably be looked for in the following years. This forecast was borne out in 1929 and in the budgets for 1930.

Perhaps the outstanding trend indicated by the figures, aside from the continued climb in the total, is

Purchases Planned by Electric Railways for 1930, Compared with Actual Figures for Past Years Compiled by "Electric Railway Journal"

New Plant and Equipment—Capital

	1925	1926	1927	1928	1929	Forecast 1930
Way and structures	$52,400,000	$51,200,000	$77,365,000	$90,050,000	$81,890,000	$88,400,000
Cars	50,400,000	40,000,000	34,758,000	18,900,000	28,710,000	31,800,000
Buses	15,680,000	17,540,000	14,368,000	19,100,000	17,300,000	19,900,000
Power equipment	5,150,000	7,640,000	3,561,000	7,300,000	7,570,000	8,950,000
Total	$123,630,000	$116,380,000	$130,052,000	$135,350,000	$135,470,000	$149,050,000

Maintenance Materials—Operating

Way and structures	$56,900,000	$50,000,000	$40,517,000	$31,040,000	$35,800,000	$35,790,000
Cars	54,700,000	47,800,000	36,941,000	35,200,000	36,350,000	36,520,000
Buses	7,370,000	7,500,000	9,451,000	15,040,000	17,925,000	19,650,000
Power equipment	22,650,000	11,370,000	8,310,000	9,100,000	10,460,000	10,520,000
Total	$141,620,000	$116,670,000	$95,219,000	$90,380,000	$100,535,000	$102,480,000

Total of New Plant and Equipment, and Maintenance Materials

Way and structures	$109,300,000	$101,200,000	$117,882,000	$121,090,000	$117,690,000	$124,190,000
Cars	105,100,000	87,800,000	71,699,000	54,100,000	65,060,000	68,320,000
Buses	23,050,000	25,040,000	23,819,000	34,140,000	35,225,000	39,550,000
Power equipment	27,800,000	19,010,000	11,871,000	16,400,000	18,030,000	19,470,000
Grand total	$265,250,000	$233,050,000	$225,271,000	$225,730,000	$236,005,000	$251,530,000

Mount Upward

By
CLIFFORD A. FAUST
Assistant Editor *Electric Railway Journal*

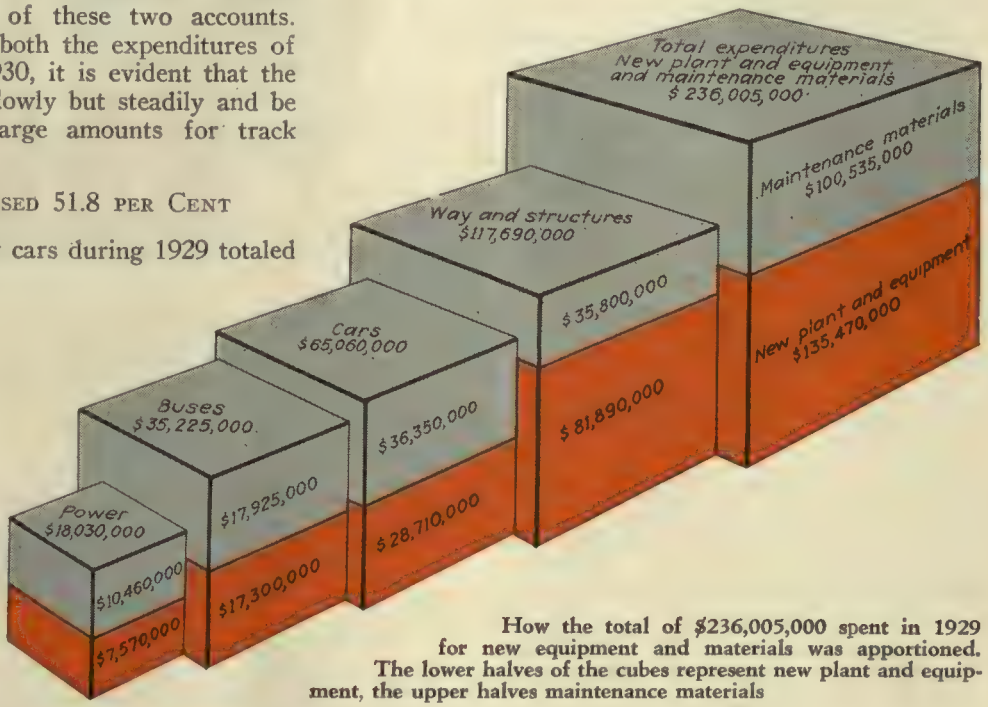
the buying movement in rolling stock, following and now accompanying a period of great track activity. Last year's low mark of $18,900,000 for cars and the high mark of $90,050,000 for way and structures indicated that operators were preparing for the extensive purchase of new equipment by conditioning their track. Their budgets submitted a year ago also showed the same trend, giving an estimate of approximately $30,000,000 for cars in 1929 and slightly under $80,000,000 for way and structures. Actual expenditures in 1929 of $28,710,000 for cars and $81,890,000 for way and structures bear out the trend as foreseen. The predicted increases of 7.95 per cent for way and structures and 10.76 per cent for cars indicate a return to normalcy in the relation of these two accounts. Surveying the past trends in both the expenditures of 1929 and the forecasts for 1930, it is evident that the buying of cars will increase slowly but steadily and be accompanied by reasonably large amounts for track reconstruction.

Car Purchases Increased 51.8 per Cent

Actual expenditures for new cars during 1929 totaled $28,710,000, an increase of $9,810,000, or 51.8 per cent, over 1928. Definite information received last year indicated that several large orders for car equipment would be placed. All of these and several others were placed during the year. Among the outstanding orders of the year were 300 subway cars for the City of New York, 141 suburban motor cars for the Delaware, Lackawanna & Western Railroad, 106 for the Cleveland Railway, 101 for the City of Detroit, 101 for the Brooklyn & Manhattan Transit Corporation, 100 for the Chicago Surface Lines, 50 for the Montreal Tramways and 25 for the Market Street Railway. Other large orders were 42 locomotives for the New York Central Railroad and 22 heavy passenger locomotives for the Cleveland Union Terminals Company. Total orders of new equipment for the year were 77 electric locomotives and approximately 1,400 cars, including freight, express and service cars.

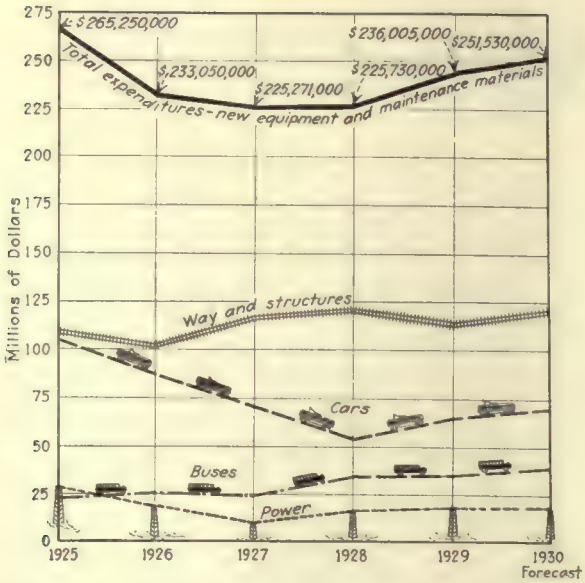
That the large number of cars purchased in 1929 is not an unusual number is indicated in the budgets of 1930, which show that cars purchased in that year will even exceed in value those of 1929. Definite orders totaling 522 were shown on the budgets submitted. Of this number 417 will be ordered by nine companies in lots of 135, 66, 60, 50, 32, 23, 20, 16 and 15, respectively. An important evident trend is that many of the smaller companies will order cars in 1930, increasing their percentage which in the past years has not been very high. In view of the fact that the smaller cities are having more difficulty than the larger ones this is particularly encouraging. Although no definite announcements have been made of large orders for rapid transit or steam road electrification equipment, it is not unlikely that at least one or two such orders will be placed. Considering the low figure for 1928, when car purchases were at an ebb, there is much reason for optimism with the present outlook. It appears that the extensive experimentation and development of modern equipment, which delayed car purchases for a time, will be rewarded in a normal resumption of buying.

As forecast a year ago the expenditures for way and structures, charged to capital accounts, showed a recession in 1929. The total dropped from $90,050,000 to $81,890,000, a comparatively small amount considering the large increase in car purchases. It also should be remembered that the figure for 1928 was a high mark for this account, since these figures were first compiled in 1923, and that the 1929 figure of $81,890,000 exceeds all other totals except the one for 1928. That this activity in track is to continue is indicated in the forecast for 1930 of $88,400,000, an increase of $6,510,000. No doubt the way and structures account will continue to exceed the $80,000,000 mark in succeeding years.



How the total of $236,005,000 spent in 1929 for new equipment and materials was apportioned. The lower halves of the cubes represent new plant and equipment, the upper halves maintenance materials

During the past year more than 700 miles of track was rebuilt, over 165 miles of track extension was made and approximately 200 miles of steam railroad lines was electrified. These figures compare with slightly more than 890 miles of rebuilt track in 1928 and 230 miles of extensions. Structures, of course, account for an appreciable percentage of the total way



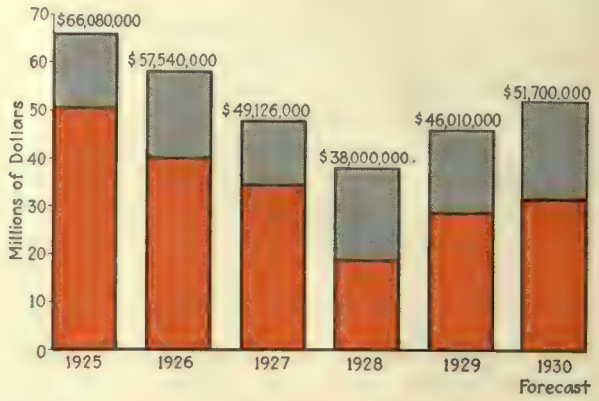
Distribution by individual accounts of new plant and equipment and maintenance materials, for the years 1925 to 1929, inclusive, and the forecasts for 1930. Note the upward turn following 1927

and structures figure. Since structures and track are not segregated on the budget blanks it is impossible to give the exact proportions of the two.

As mentioned previously, way and structures will total $88,400,000 in 1930. It was definitely indicated on the budget blanks that 22 companies would alone expend $17,110,000 for this account. Representing the larger programs, five companies will spend a total of $9,000,000, in amounts of $3,000,000, $2,500,000, $1,300,000, $1,200,000 and $1,000,000. Seven programs under $1,000,000, totaling $4,942,000, are $889,000, $800,000, $700,000, $685,000, $655,000, $633,000 and $580,000. Ten smaller programs, totaling $3,168,000, are $487,000, $466,000, $367,000, $350,000, $349,000, $261,000, $250,000, $229,000, $209,000 and $200,000. These programs in many instances are accompanying large orders for equipment. Others are probably the forerunners of rolling stock buying, just as many orders of 1929 followed the extensive track rehabilitation in 1928.

Falling slightly short of the high mark for buses in 1928, but practically equaling the second highest mark for 1926, expenditures for new buses during 1929 totaled $17,300,000. This figure compares with $19,100,000 for 1928, $14,368,000 in 1927 and $17,540,000 for 1926. The actual number of new buses bought totaled more than 1,800 in 1929 as compared with approximately 2,100 in 1928. An increase of $2,600,000, however, is forecast by the electric railways for 1930. This increase, together with increases of practically the same percentages in the other three capital accounts indicates a steady and normal expansion in every department.

Adding 1,800 new buses during 1929 brings the total now being operated by electric railways to more than 12,400. Since a large number of these have been in service for more than five years a considerable proportion of the buses bought this year were for replacement. This proportion should increase in the following years. With the steady expansion which has character-



Combined values of cars and buses bought during 1925-1929 and the forecasts for 1930. The lower portions represent cars, the upper portions buses. The 1929 and 1930 figures indicate a pronounced climb from the low point of 1927

ized this type of service since it was first adopted by the electric railways, and the ever-increasing number for replacement, the sales should continue to be high. In one or two more years the number of buses for replacement actually should exceed the numbers purchased in the years of its expansion.

In 1928 the total figure for cars and buses reached a low mark at $38,000,000. This followed similar decreases in the previous years, the total for 1925 being $66,080,000, that for 1926 being $57,540,000 and that for 1927 being $49,126,000. It was predicted in pre-

Maintenance Materials and Labor

		Way and Structures	Cars	Buses*	Power	Total
1927 Expenditures	Material	$40,517,000	$36,941,000	$9,451,000	$8,310,000	$95,219,000
	Labor	66,874,000	44,952,000	6,592,000	8,244,000	126,662,000
	Total	$107,391,000	$81,893,000	$16,043,000	$16,554,000	$221,881,000
1928 Expenditures	Material	$31,040,000	$35,200,000	$15,040,000	$9,100,000	$90,380,000
	Labor	50,400,000	49,300,000	11,870,000	6,580,000	118,150,000
	Total	$81,440,000	$84,500,000	$26,910,000	$15,680,000	$208,530,000
1929 Expenditures	Material	$35,800,000	$36,350,000	$17,925,000	$10,460,000	$100,535,000
	Labor	52,800,000	49,380,000	13,540,000	5,730,000	121,450,000
	Total	$88,600,000	$85,730,000	$31,465,000	$16,190,000	$221,985,000
1930 Estimated expenditures	Material	$35,790,000	$36,520,000	$19,650,000	$10,520,000	$102,480,000
	Labor	51,360,000	50,200,000	12,470,000	5,660,000	119,690,000
	Total	$87,150,000	$86,720,000	$32,120,000	$16,180,000	$222,170,000

*Bus maintenance materials include replacement parts, tires and tubes.

	1929	Forecast 1930
Bus operating supplies, including fuel and lubricants	$20,720,000	$22,510,000

vious articles that 1928 would be the low year, and it was. Mounting to $46,010,000 the total for 1929 exceeded that for 1928 by $8,010,000 and almost reached the combined figure for 1927. It is of particular significance that the total for cars and buses in 1930 will continue to climb, reaching $51,700,000. This figure will be an increase of $5,690,000 over 1929 and will exceed the totals for the three previous years.

Expenditures for new power equipment in 1929 were $7,570,000, exceeding the 1928 figure by $270,000. Because of several rather extensive programs being planned and under way the total for 1930 will amount to $8,950,000. Among the larger expenditures for new power equipment of the past year were those for the Cleveland Union Terminal electrification and the Lackawanna project.

Following a slight recession in the year 1928 the total of maintenance materials, charged to operating accounts, showed an increase of $10,155,000, or 11.2 per cent. All of the accounts showed increases, the first time since these figures have been compiled. The new total was $100,535,000, compared with $90,380,000 for 1928. Way and structures showed an increase of $4,700,000; cars, $1,150,000; buses, $2,885,000; and power equipment, $1,360,000. The way and structures increase is accounted for in the increased expenditure in track maintenance accompanying the decreased amount of track reconstruction. During 1928, when the new plant and equipment for way and structures showed a large increase, the maintenance materials dropped. In 1929 the two accounts were reversed, the capital account showing a decrease and maintenance an increase. During 1930 maintenance materials for way and structures will remain practically the same, varying only $10,000.

One of the most encouraging results of all the maintenance figures is the increase shown in maintenance materials for cars. From the time these figures were first compiled car maintenance materials have decreased each year. Although the increase shown in 1929 is not a very large one it does indicate that the downward turn has been stemmed. The decrease in 1928 was much smaller than in any previous year, which indicated that no doubt the low point would be reached in the first part of 1929 and then go upward. The actual total for 1929 and the forecast for 1930, showing another increase, proved that this theory was true.

Exceeding the previous high mark of $15,040,000 by $2,885,000 the 1929 total of bus maintenance materials reach a new high mark at $17,925,000. This figure includes replacement parts, tires and tubes, but not fuel and lubricants. Bus maintenance materials have shown a steady climb, the increases being almost in direct proportion with the number of buses being used by the electric railways. During 1930 the total will again increase, reaching $19,650,000.

Bus operating supplies, including fuel and lubricants, totaled $20,720,000 for the year. This figure is the first one obtained on the budget blanks, so that no comparison can be made with previous years. However, this figure should increase more nearly in proportion with the number of buses in operation than the maintenance materials. In 1930 this account will increase to $22,510,000. It is interesting to note that fuel and lubricants actually exceed the cost of replacement parts, tires and tubes.

Maintenance materials for power equipment showed an increase of $1,360,000, reaching the figure of $10,460,000. In 1930 materials for power plant, substation and line maintenance will show another increase. It appears from the figures for the past three years and the forecast for 1930 that this account will vary but little each year.

With the exception of power all departments showed an increase in 1929 of expenditures for maintenance labor. Way and structures showed an increase of $2,400,000, cars an increase of $80,000, and buses one of $1,670,000. These increases brought the total for maintenance materials for 1929 up to $121,450,000, an increase of $3,300,000. The most consistent increases are shown by buses, this account mounting from $6,592,000 in 1927 to $11,870,000 in 1928 and $13,540,000 in 1929. The forecasts for 1930 indicate that maintenance labor for every account will remain practically the same.

Because all of the maintenance material accounts showed increases in 1929 over 1928 and maintenance labor varied little, the combined total for both maintenance materials and labor showed an increase. From the previous figure of $208,530,000 the total mounted to $221,985,000. The combined total for 1930 is set by the industry at $222,170,000. It is of real significance that the totals for each account increased. Maintenance figures ordinarily do not fluctuate because maintenance practices on individual properties do not vary much within a period of twelve months. Increases in every account, therefore, can only indicate that the railways are bettering their standards of maintenance.

In the article of last year the percentages were computed of maintenance materials to the total of materials and labor. Budgets for 1929 indicated that the percentages were practically the same as for 1928, being 40.3 for way and structures, 41.2 for cars, 57.0 for buses, 64.5 for power and 45.3 for the total.

Outstanding Facts Revealed by the Budget Data

DURING 1929

The total for new plant and equipment and maintenance materials showed an increase of $10,275,000.

Car purchases totaled $28,710,000, an increase of $9,810,000, or 51.8 per cent.

Power equipment expenditures for both new plant and maintenance material increased.

Total maintenance materials increased from $90,380,000 to $100,535,000.

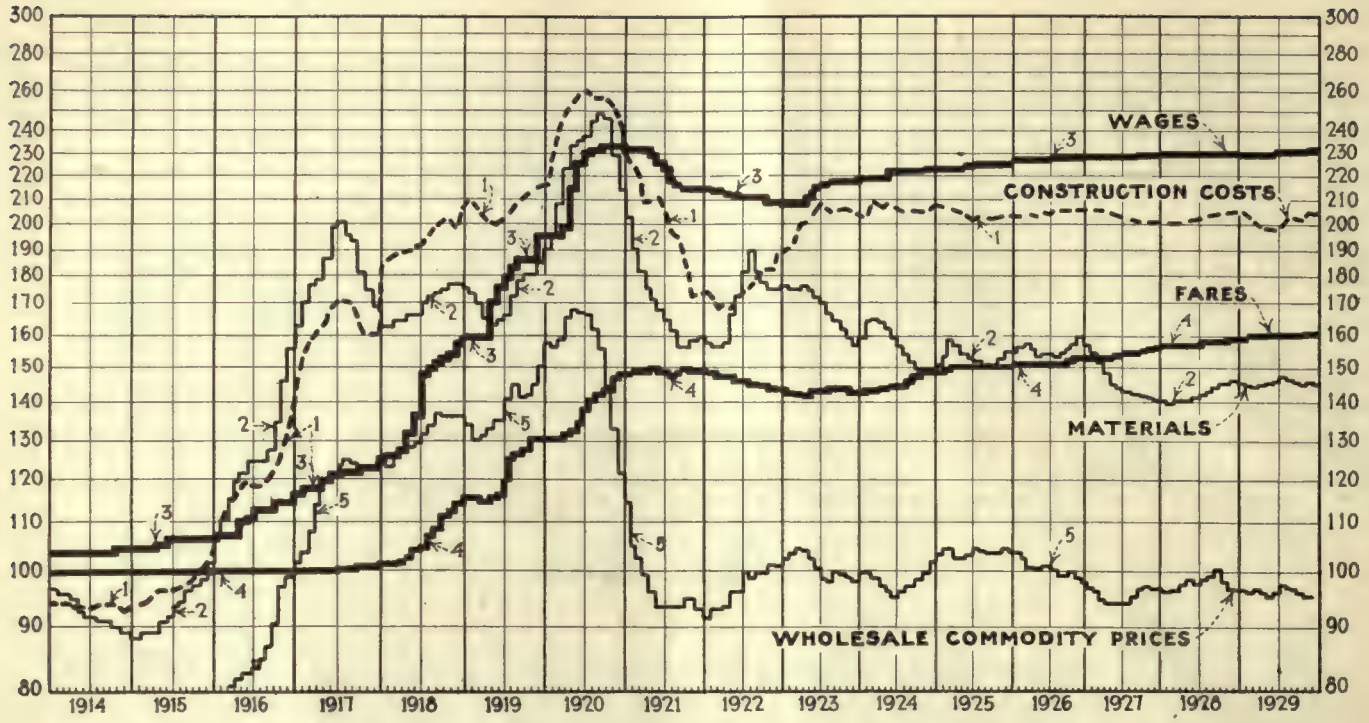
DURING 1930

The total of all expenditures for new equipment and maintenance materials will increase more than in 1929, reaching the mark of $251,530,000.

Car purchases will again be high and will exceed those of 1929.

Both buses and power equipment will increase.

Maintenance materials and labor will not vary much from the 1929 figures.



Trend of Construction and Operating Costs, Wages and Fares, 1914-1929

1. Electric railway construction costs (according to American Electric Railway Association).

2. Electric railway operating materials costs (Richey). Includes fuel for power, weighted according to average use in maintenance and operation.

3. Electric railway wages (Richey). Maximum hourly wages of platform men, weighted according to number of men.

4. Street railway fares (Richey). U. S. cities (except New York), weighted according to population.

5. Wholesale commodity prices (U. S. Bureau of Labor Statistics).

AVERAGE FARES AND COSTS 1913-1929

Base 1913 = 100

	Street Railway Fares (Richey)	Elec. Ry. Operating Materials Costs (Richey)	Electric Railway Wages (Richey)	Elec. Ry. Construction Costs (Am. Elec. Ry. Assn.)	General Construction Costs (*Eng. News-Record*)	Wholesale Prices, All Commodities* (U. S. Bur. Lab. Stat.)
1913.....	100.0	100.0	100.0	100.0	100.0	69.8
1914.....	100.0	92.6	104.2	94.0	88.6	68.1
1915.....	100.1	93.5	106.2	97.3	92.6	69.5
1916.....	100.1	126.2	111.6	119.8	129.6	85.5
1917.....	100.5	181.9	120.6	162.7	181.2	117.5
1918.....	106.2	168.8	140.5	192.5	189.2	131.3
1919.....	120.7	172.2	174.0	205.1	198.4	138.6
1920.....	137.2	224.6	217.3	244.7	251.3	154.4
1921.....	148.9	169.9	222.7	200.7	201.8	97.6
1922.....	146.0	170.0	210.0	175.2	174.4	96.7
1923.....	142.9	168.0	212.1	200.2	214.1	100.6
1924.....	149.2	156.0	219.2	204.6	215.4	98.1
1925.....	150.2	153.1	222.2	202.4	206.7	103.5
1926.....	152.2	155.0	225.3	202.6	208.0	100.0
1927.....	154.6	145.7	227.5	201.1	206.2	95.4
1928.....	157.7	142.2	229.3	203.1	206.8	97.6
1929.....	160.2	145.6	230.6	202.4	207.0	

*Base 1926 = 100.

MONTHLY INDEX OF FARES AND COSTS FOR PAST FOUR YEARS

Base 1913 = 100

1926	Street Railway Fares (Richey)	Elec. Ry. Operating Materials Costs (Richey)	Electric Railway Wages (Richey)	Elec. Ry. Construction Costs (Am. Elec. Ry. Assn.)	General Construction Costs (*Eng. News-Record*)	Wholesale Prices, All Commodities* (U. S. Bur. Lab. Stat.)
January....	151.2	154.3	223.8	202.2	207.2	103.6
February...	151.8	155.3	223.8	201.9	206.6	102.1
March.....	151.9	156.4	224.1	202.0	207.6	100.4
April.....	151.9	154.2	224.7	201.3	207.0	100.1
May.....	151.9	153.1	225.4	202.4	207.3	100.5
June.....	152.1	154.4	225.5	201.9	204.8	100.5
July.....	152.0	154.1	225.7	203.2	207.8	99.5
August....	152.0	153.1	225.9	203.6	208.3	99.0
September..	512.0	154.2	226.1	203.2	208.3	99.7
October....	152.8	155.4	226.2	202.9	209.8	99.4
November..	153.2	156.6	226.3	203.7	210.8	98.4
December..	153.2	159.2	226.3	203.2	210.8	97.9
1927						
January....	153.2	156.0	226.6	203.5	211.5	96.6
February...	153.8	154.0	226.7	202.9	210.2	95.9
March.....	153.4	152.1	226.7	203.0	208.8	94.5
April.....	153.4	148.0	226.9	202.6	209.0	93.7
May.....	153.6	144.2	227.4	201.0	206.8	93.7
June.....	153.6	143.0	227.5	200.6	205.6	93.8
July.....	155.2	142.9	227.8	199.9	203.7	94.1
August....	155.3	142.1	227.9	200.9	205.5	95.2
September..	155.5	141.6	228.0	199.4	203.6	96.5
October....	155.7	141.8	228.2	199.8	204.4	97.0
November..	156.1	141.3	228.3	199.4	202.0	96.7
December..	156.2	140.6	228.4	200.7	203.9	96.8
1928						
January....	156.7	140.6	228.6	200.9	203.9	96.3
February...	156.7	139.5	228.7	200.9	204.6	96.4
March.....	157.2	140.1	228.8	200.5	204.6	96.0
April.....	157.2	140.0	228.8	201.2	206.4	97.4
May.....	157.3	140.4	229.2	201.9	207.0	98.6
June.....	157.3	141.4	229.2	202.7	206.2	97.6
July.....	157.7	141.8	229.2	203.3	206.6	98.3
August....	158.0	142.5	229.7	204.5	207.3	98.9
September..	158.1	144.2	229.7	204.4	207.3	100.1
October....	158.2	144.9	229.9	205.5	207.7	97.8
November..	158.9	145.1	229.9	205.7	209.5	96.7
December..	159.3	145.5	229.8	205.1	210.2	96.7
1929						
January....	159.3	145.3	229.9	204.5	209.4	97.2
February...	160.0	145.0	229.9	205.2	210.4	96.7
March.....	160.0	144.8	230.1	203.4	207.8	97.5
April.....	160.0	145.0	230.1	200.9	203.4	96.8
May.....	160.2	145.5	230.1	199.5	205.2	95.8
June.....	160.3	145.8	230.8	199.7	205.6	96.4
July.....	160.3	147.5	230.8	199.0	204.8	98.0
August....	160.3	146.4	231.0	200.8	205.9	97.7
September..	160.3	146.1	231.0	203.4	207.6	97.5
October....	160.3	145.6	231.1	203.0	206.3	96.3
November..	160.6	145.7	231.1	204.8	208.5	94.4
December..	160.6	144.9	231.1	205.1	209.5	

*Base 1926 = 100.

Electric Railway

Fares and wages continue to increase, but in a smaller measure than during 1928 and 1927. Commodity prices and construction costs maintain a level practically the same as during the past three years

Costs and Fares in 1929

By
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Worcester, Mass.

FOR several years past the ELECTRIC RAILWAY JOURNAL has published monthly in its financial and corporate section a series of index numbers compiled by the writer under the heading of "Conspectus of Indexes." This conspectus is made up of indexes showing the trends of street railway fares and of the costs of electric railway wages and materials entering into electric railway operation; costs of construction, both electric railway and general; wholesale commodities in general; retail food; cost of living, and some others. In the annual statistical numbers of the JOURNAL, the first issue in January each year, beginning in 1923, charts and tables have been presented showing the trend since 1913 of the most important of these indexes as affecting electric railway operation. In Fig. 7 herewith is shown a similar chart indicating the trend of five of these indexes from January, 1914, through the latest available figures for 1929. The indexes there shown are: (1) Electric Railway Construction Costs, as computed by the formula of the American Electric Railway Association; (2) Electric Railway Operating Materials Costs, including fuel for power; (3) Electric Railway Wages; (4) Street Railway Fares; (5) Wholesale Prices of All Commodities, as computed by the U. S. Bureau of Labor Statistics.

The methods used in the computation of these five indexes were described fully on page 37 of the JOURNAL for Jan. 2, 1926, in an article which also contained a tabulation showing the numerical values of the various indexes monthly from January, 1920, through December, 1925. The earlier monthly numerical values, from January, 1914, through December, 1919, may be found on page 19 of the Journal for Jan. 5, 1924. A tabulation herewith shows the numerical value of six of the indexes yearly from 1913 through 1929, and monthly beginning with January, 1926, and these six indexes also are shown graphically for the past four years on a somewhat larger scale than in Fig. 7 by the charts Figs. 1 to 6, inclusive.

The weighted average street railway fare, as shown by the Richey index in Fig. 1, has increased during 1929 from 7.71 cents to 7.78 cents, an increase of 0.8 per cent during the year. This is a slowing up of the rate of increase in the average fare, as this index showed a 2 per cent gain in 1928 following a 2 per cent gain in 1927. Ten of the 143 cities which affect this index reported increases in street railway fares during 1929, the most important of these increases being in Louisville, Minneapolis and St. Paul. Other changes were of less importance as affecting the index, either on account of the smallness of the changes or the relatively small population involved. It will be noted that the index of the American Electric Railway Association, which is also shown in Fig. 1, shows not only a higher average

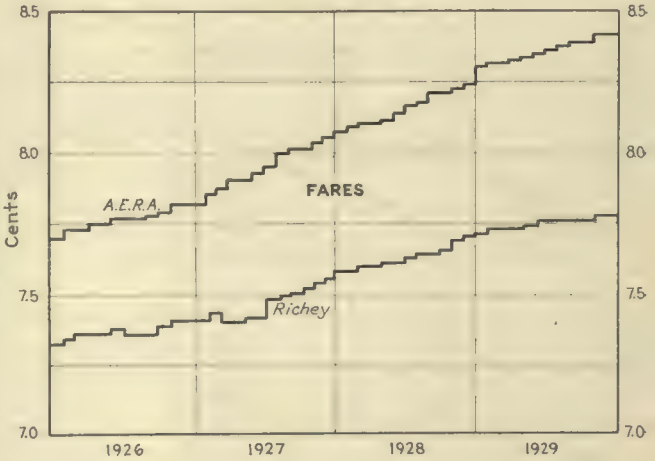


Fig. 1—Street Railway Fares (1913 = 4.8425 cents)

fare, but a slightly greater increase in the average than does the Richey index. This is on account of the fact that the American Electric Railway Association Fare Index includes all cities of more than 25,000 population, is an average of cash fares only, and is not a weighted average, so that each city is of equal importance in the final average regardless of its size or the number of passengers affected by the fare. On the other hand, the Richey index includes only cities of more than 50,000 population (excluding New York City), and in computing the average the fares are weighted in accordance

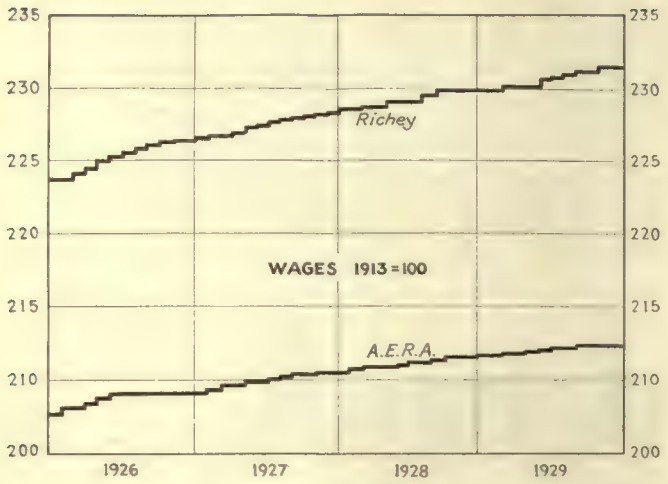


Fig. 2—Electric Railway Wages

with the populations of the cities; further, for each city where reduced rate tickets are used consideration is given to both cash and ticket rates, except that children's or workmen's tickets or other forms of special reduced rates are not included.

Electric railway wages, as shown by the indexes in Fig. 2, have continued the gradual upward trend which started in 1923. The Richey index which includes wages on 130 street and interurban railways, weighted in accordance with the number of trainmen employed on such railways, shows an increase of about 0.6 per cent during 1929 and now stands at 231. The principal increases in wages have been in Chicago, St. Louis, Indianapolis, Cincinnati, Louisville, Ft. Wayne, Toledo, Wilmington and Memphis, these cities being named in the order of the effect of the 1929 wage change on the index. The American Electric Railway Association Wage Index uses wages on 85 railways and is unweighted with respect

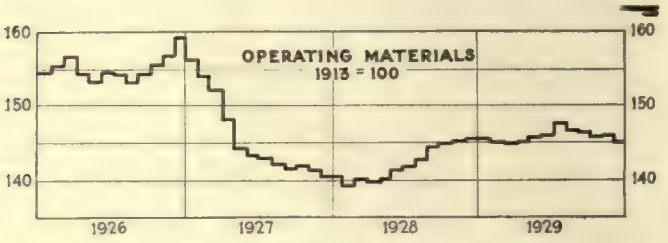


Fig. 3—Electric Railway Operating Materials

to the number of men employed. Both indexes indicate about the same measure of increase in trainmen's wages during the past four years.

A computation of an index of "real wages" of electric railway trainmen as compared with 1913 and 1914 may be made by dividing the index of wages by the index of the cost of living. This indicates an index of "real wages" (on the base of 1913-14) of 141.5 at the end of 1929, which may be compared with 141 at the end of 1928 and 138 at the end of 1927. Such increases in the "real wages" index for street railway employees show their steadily increasing opportunity to better their standard of living.

The cost of electric railway operating materials was maintained at a fairly uniform level during 1929. This index, as shown by Fig. 3, declined from a high of 159 in December, 1926, to a low of 139.5 in February, 1928, and recovered to practically its present level by November, 1928. It should be borne in mind that in the make-up of this index, fuel for power enters into it with a weighting of 40 per cent.

Electric railway construction costs have remained very steadily at about their present level since the middle of 1923, as indicated by the American Electric Railway Association Construction Cost Index, shown on page 12

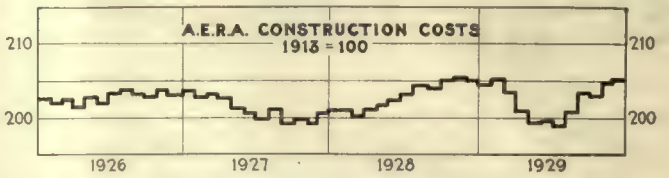


Fig. 4—A.E.R.A. Electric Railway Construction Costs

and on a larger scale for the past four years in Fig. 4. This index of electric railway construction costs may be compared with the general construction cost index of the *Engineering News-Record,* which is shown in Fig. 5 for the past four years. The latter includes structural steel and other building materials in a considerably greater weighting than such materials are used in the Electric Railway Construction Cost Index, which is

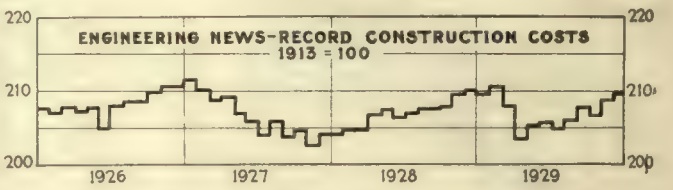


Fig. 5—Engineering News-Record Construction Costs

somewhat stabilized by the heavier weighting of steel rail, the price of which has remained constant since October, 1922. The Electric Railway Construction Cost Index has, however, a heavier weighting of the common labor rate, which started the year at about 56 cents, dropped to 53 cents during the summer months, and has recovered to 56½ cents at the end of the year.

The Wholesale Commodity Index of the United States Bureau of Labor Statistics is shown for the past four years in Fig. 6, and from 1916 on in the large chart. Its level during 1929 has been not greatly different from that of 1928. This index is the only one of those presented here which has a base other than the year 1913. The base of 1913 = 100 for the Wholesale Commodity Index was discontinued in August, 1927, and since then it has been calculated on the base of 1926 = 100 and is so shown in the accompanying tables and charts.

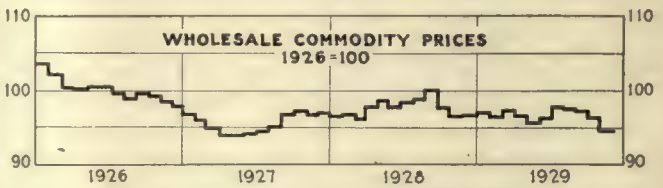


Fig. 6—Bureau of Labor Statistics Wholesale Commodity Prices

Favorable indications in the index figures are the even trends of prices for several years, continuing through 1929, along with an increase in fares. The only disturbing element is the uptrend of wages, making them an increasing item in operating cost. Otherwise all the indications for the coming year are favorable.

Industry Strengthened by

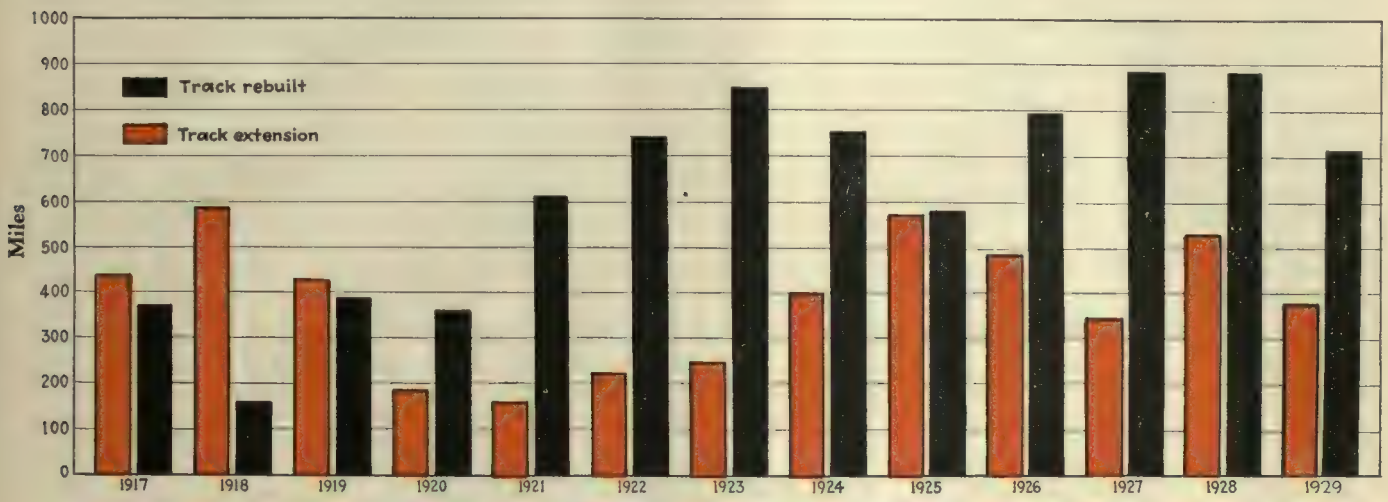
Trackage Readjustment

By

JOHN A. MILLER, JR.

Managing Editor

Electric Railway Journal



Summary of track extensions and reconstructions since 1917

Survey of changes which have occurred during past ten years shows that extensions made by electric railways have largely offset abandonments of unprofitable lines. Despite the steady growth of bus operation the net decrease in electric trackage has been less than 10 per cent. Mileage of extensions and also of abandonments decreased in 1929 as compared with 1928. Volume of track reconstruction continued large on both urban and interurban properties

Comparison of Track Construction by Years

Year	Track Extensions Number of Companies	Track Extensions Miles	Track Rebuilt Number of Companies	Track Rebuilt Miles	Electrified Steam Lines Miles
1908	157	1,174.5	(a)	(a)	84.00
1909	160	774.7	(a)	(a)	112.40
1910	217	1,204.8	(a)	(a)	192.40
1911	223	1,105.0	(a)	(a)	86.50
1912	171	869.4	(a)	(a)	80.80
1913	181	974.9	(a)	(a)	119.00
1914	163	716.5	(a)	(a)	229.00
1915	136	596.0	(a)	(a)	448.20
1916	104	356.30	(a)	(a)	388.00
1917	121	376.70	150	375.40	66.00
1918	80	313.82	81	155.43	275.70
1919	73	140.57	148	389.89	287.60
1920	87	176.56	131	361.77	8.92
1921	78	147.10	184	615.21	8.08
1922	104	211.38	212	739.70	12.35
1923	132	233.15	241	854.63	26.12
1924	112	312.08	218	764.33	83.39
1925	100	339.79	179	578.90	236.36
1926	95	317.96	...	802.52	169.52
1927	95	192.41	212	887.94	140.70
1928	103	238.94	216	894.73	276.14
1929	81	167.71	190	700.14	204.85

(a) Information not available.

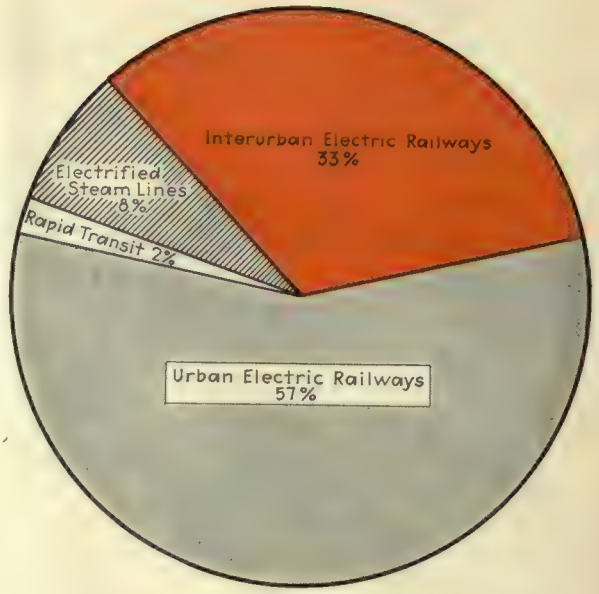
MANY changes in physical plant have been made by the electric railways in recent years to meet the changing transportation requirements of the public. Although somewhat smaller in extent, the changes which occurred in 1929 were similar in character to those of other recent years. During the past decade a considerable amount of track has been abandoned where operation proved unprofitable. At the same time the electric railways have been active in adding to their trackage in profitable territory. The net result of these changes has been a decrease of about 9½ per cent in the total electrified track mileage in the United States and Canada. Undoubtedly the readjustment of trackage by abandonments in some localities and extensions in others has greatly strengthened the position of the industry.

In all, approximately 1,050 miles of track was built or rebuilt in 1929. Extensions of electric trackage made during the year totaled nearly 380 miles. This total was divided almost equally between additions to the trackage of the local transportation systems and additions to the

electrified trackage of the steam railroads. Extensions made to rapid transit track mileage were relatively unimportant.

While the mileage of extensions made in 1929 was somewhat below that of the preceding year, it was slightly above the average for the past ten years. Since Jan. 1, 1920, the urban and interurban electric railways of the United States and Canada have added a total of 2,337.08 miles of track to their systems. Approximately 70 per cent of these extensions were made by the urban railways and 30 per cent by the interurbans. During the same period the steam railroads added 1,166.43 miles to their electrified trackage. Thus the total increase in electric railway track has been approximately 3,500 miles or an average of about 350 miles per year. The mileage of extensions is summarized by years in an accompanying table.

Some 80 electric railways made extensions to their trackage last year. Among the important additions reported by these companies are 16.48 miles built by the Department of Street Railways, Detroit, 11.52 miles by the Montreal Tramways, 10.94 miles by the Cleveland Railway, 10.45 miles by the Milwaukee Electric Railway & Light Company, 5.21 miles by the Pacific Electric Railway, 19.98 miles by the Sacramento Northern Railway, and 23.76 miles by the Oklahoma Railway. Numerous other extensions were made, ranging in length from a fraction of a mile to 5 miles. The complete list of extensions made in 1929 is tabulated below. A number of additions made to the electrified track mileage of the steam railroads are discussed in greater detail elsewhere in this issue.



Classification of electrified track mileage

Nearly 200 electric railways reported reconstruction of track during the year just ended. This is about the same number as in other recent years. In all, a total of more than 700 miles of track was rebuilt, of which approximately 475 miles was in paved street and 225 miles was open construction. The total figure for 1929 is slightly less than that for 1928, but about the same as the average for the past ten years. This decrease in

Track Extensions in 1929

Name of Company	Miles
Alabama	
Birmingham Elec. Co.	0.02
California	
Market St. Ry., San Francisco	0.30
Pacific Elec. Ry.	5.21
Peninsular Ry., San Jose	0.75
Sacramento Northern Ry.	19.98
Visalia Elec. R.R.	0.10
Connecticut	
Connecticut Company	1.80
Delaware	
Delaware Elec. Power Co.	0.29
Florida	
Miami Beach Ry.	0.48
Tampa Electric Co.	0.04
Illinois	
Calumet & South Chicago Ry.	0.14
Chicago, Aurora & Elgin R.R.	0.25
Chicago City Ry.	0.07
Chicago Rys.	0.23
Chicago, North Shore & Milwaukee R.R.	3.45
St. Louis & Belleville Elec. Ry.	0.41
Indiana	
Chicago, South Shore & South Bend R.R.	4.00
Indianapolis Street Ry.	0.19
Indiana Service Corp.	0.36
Lafayette Street Ry.	1.00
Union Traction Co.	0.25
Kentucky	
Louisville Ry.	1.13
Louisiana	
New Orleans Public Service Inc.	0.80
Maryland	
United Rys. & Elec. Co., Baltimore	4.45
Massachusetts	
Berkshire St. Ry.	0.21
Boston Elevated Ry.	2.60
Eastern Mass. Street Ry.	4.91
Worcester Consolidated St. Ry.	0.22
Michigan	
Dept. of Street Rys., Detroit	16.48
Eastern Michigan Ry.	1.50
Minnesota	
Duluth Street Ry.	0.59
Twin City Rapid Transit Co.	4.00
Missouri	
Kansas City Public Service Co.	1.14
St. Louis Public Service Co.	1.10
Nebraska	
Omaha & Council Bluffs Street Ry.	0.97
New York	
International Ry., Buffalo	0.45
New York, Westchester & Boston Ry.	2.92
Niagara Junction Ry.	0.60
Third Avenue Railway	0.13
Steinway Railway	0.04
North Dakota	
Northern States Pwr. Co., Fargo	0.14
Ohio	
Cincinnati Street Ry.	0.18
Community Traction Co.	0.21
Cleveland Ry.	10.94
Ohio Public Service Co.	0.11
Pennsylvania-Ohio Pwr. & Lt. Co.	0.27
Toledo Western Ry.	0.13
Oklahoma	
Oklahoma Railway	23.76
Oklahoma Union Ry.	0.82
Oregon	
Portland Electric Power Co.	2.00
Pennsylvania	
Conestoga Traction Co.	0.43
Harrisburg Rys.	0.28
Philadelphia Rapid Transit Co.	3.22
Pittsburgh Railways	2.91
York Railways	0.27
Rhode Island	
United Elec. Rys., Providence	0.27
Tennessee	
Memphis Street Ry.	0.0
Texas	
Dallas Ry. & Terminal Co.	0.28
Eastern Texas Elec. Co.	0.23
Houston North Shore Ry.	0.33
Texas Electric Ry.	1.50
Utah	
Salt Lake & Utah R.R.	1.65
Virginia	
Lynchburg Traction & Light Co.	0.35
Virginia Public Service Co.	0.10
Washington	
Seattle Municipal Street Ry.	0.42
Spokane, Coeur d'Alene & Palouse Rys.	0.12
Tacoma Ry. & Power Co.	0.17
Yakima Valley Transportation Co.	0.06
West Virginia	
Monongahela West Penn. Pub. Serv. Co.	0.08
Wisconsin	
Milwaukee Elec. Ry. & Light Co.	10.45
Wisconsin Gas & Elec. Co.	0.38
Canada	
British Columbia Elec. Ry.	0.30
Cornwall Street Ry. Light & Power Co.	0.50
Hamilton Street Ry.	4.00
Montreal Tramways	11.52
Niagara, St. Catherines & Toronto Ry.	0.20
Nova Scotia Light & Power Co.	0.17
Oshawa Ry.	0.48
Saskatoon Municipal Ry.	1.20
Sherbrooke Elec. Ry. & Power Co.	0.11
Winnipeg Elec. Co.	3.27
Total	167.71

the volume of track reconstruction done last year as compared with the preceding year was to be expected, however, as the budget figures published in the Jan. 12, 1929, statistical issue of ELECTRIC RAILWAY JOURNAL showed a slight reduction in the expenditures planned for way and structures in 1929 as compared with 1928. Indications from similar reports received during the past few weeks are that the volume of trackwork which will be done during the coming year will show a considerable increase.

The largest single program of track reconstruction reported for the year 1929 was that of the Department of Street Railways, Detroit, which rebuilt more than 42 miles of track. Next in size were the programs of the Pittsburgh Railways, Public Service Co-ordinated Transport and the Philadelphia Rapid Transit Company which rebuilt about 32, 26 and 25 miles of track, respectively. Other urban railways reporting more than 10 miles of reconstruction during the past year include the Connecticut Company, Chicago Surface Lines, Twin

Track Reconstruction in 1929

Name of Company	Miles Paved	Miles Open
Alabama		
Alabama Power Co., Anniston		0.76
Alabama Power Co., Montgomery	0.45	
Alabama Power Co., Tuscaloosa	0.15	
Birmingham Elec. Co.	2.32	6.45
Birmingham & Edgewood Elec. Ry.		0.32
Mobile Light & R.R. Co.	3.53	7.21
Arkansas		
Texarkanna Street Railway		0.20
California		
Key System Transit Co.	2.18	
Los Angeles Ry.	17.53	
Market St. Ry., San Francisco	2.22	
Municipal Ry. of San Francisco	0.77	
Pacific Elec. Ry.	3.36	11.41
Southern Pacific Co., East Bay Div.	5.84	4.62
Colorado		
Denver & Intermountain R.R.		0.04
Denver Tramway	2.60	1.23
Connecticut		
Connecticut Co.	10.90	1.02
Delaware		
Delaware Elec. Power Co.	0.65	
District of Columbia		
Capital Traction Co.	1.63	
Washington Ry. & Elec. Co.	4.07	
Florida		
Gulf Power Co., Pensacola	0.11	0.06
Jacksonville Traction Co.		1.71
Tampa Electric Co.	1.00	
Georgia		
Georgia Power Co., Atlanta	6.14	
Illinois		
Calumet & South Chicago Ry.	0.86	
Chicago, Aurora & Elgin R.R.		12.00
Chicago City Ry.	9.11	
Chicago Rys.	14.32	0.25
Chicago & Joliet Elec. Ry.	1.00	
Chicago, No. Shore & Milwaukee R.R.	1.28	3.03
East St. Louis Ry.	0.50	
Illinois Power & Light Corp., Champaign		0.04
Illinois Power & Light Corp., Decatur	0.15	
Illinois Power & Light Corp., Peoria	1.60	
Rockford Elec. Co.	0.35	
St. Louis & Alton Ry.		1.93
St. Louis & Belleville Elec. Ry.		0.41
Indiana		
Beech Grove Traction Corp.		1.00
Chicago, S. Bend & Northern Ind. Ry.	1.25	
Chicago, S. Shore & S. Bend R.R.		7.00
Indianapolis St. Ry.	1.47	1.18
Indiana Service Corp.		0.55
Lafayette Street Railway	1.00	
Terre Haute, Ind. & Eastern Trac. Co.	0.19	
Union Traction Co.	0.05	
Kansas		
Kansas Power & Light Co.	0.76	
Wichita R.R. & Light Co.	0.50	
Kentucky		
Louisville Ry.	2.09	0.88
Louisville & Interurban Ry.	0.11	
Louisiana		
New Orleans Public Service, Inc.	3.58	3.33
Maine		
Biddeford & Saco R.R.		1.50
York Utilities Co.	0.90	0.90
Maryland		
Potomac Edison Co.	0.38	
United Rys. & Elec. Co., Baltimore	7.63	1.33
Massachusetts		
Berkshire St. Ry.	0.05	1.57
Boston Elevated Ry.	5.02	2.76
Boston, Revere Beach & Lynn R.R.		4.00
Boston, Worcester & New York St. Ry.		15.00
Eastern Mass. St. Ry.	8.41	1.25
Springfield St. Ry.	2.34	2.28
Union Street Ry., New Bedford	1.00	3.00
Worcester Consolidated St. Ry.	2.22	0.34
Michigan		
Eastern Michigan-Toledo R.R.	0.10	
Eastern Michigan Railway	2.10	
Dept. of Street Railways, Detroit	40.22	2.05
Minnesota		
Duluth St. Ry.	3.11	
Northern States Pwr. Co., St. Cloud		1.00
Twin City Rapid Transit Co.	13.80	
Missouri		
Hannibal Ry. & Elec. Co.	0.19	
Kansas City Public Service Co.	0.49	
Springfield Traction Co.	1.27	
St. Joseph Ry., Lt., Ht. & Pwr. Co.	0.50	
St. Louis Public Service Co.	7.00	0.32
Montana		
Butte Elec. Ry.	0.40	
Nebraska		
Lincoln Traction Co.	0.41	
Omaha & Council Bluffs St. Ry.	0.88	0.08
Omaha Lincoln & Beatrice Ry.	0.25	
New Hampshire		
Berlin Street Railway		0.38
Nashua Street Railway	0.33	
New Jersey		
Public Service Co-ord. Transport	23.85	2.11
New York		
International Ry., Buffalo	10.51	0.54
Jamaica Central Rys.	1.35	
Jamestown Street Railway	1.23	
Manhattan & Queens Trac. Corp.	0.28	4.83
New York Rys.	0.68	
New York & Queens County Ry.	1.26	3.63
New York State Rys., Rochester	1.91	3.10
New York State Rys., Syracuse		1.96
New York State Rys., Utica	0.61	
Schenectady Ry.	1.25	
Steinway Ry.	1.61	
Syracuse & Eastern R.R.	0.58	
Triple Cities Traction Co., Binghamton	0.47	1.70
Third Ave. Ry.	12.16	
United Traction Co., Albany	1.79	
North Carolina		
Carolina Pwr. & Lt. Co., Raleigh		0.25
Tide Water Power Co., Wilmington		0.13
North Dakota		
Northern States Pwr. Co., Fargo	0.48	
Ohio		
Cincinnati, Hamilton & Dayton Ry.	0.56	0.28
Cincinnati, Newport & Covington, Ky.	3.70	
Cincinnati St. Ry.	15.00	1.62
Cleveland Ry.	8.35	0.71
Cleveland Southwestern Ry. & Lt. Co.	0.50	
Columbus Ry., Pwr. & Lt. Co.	1.49	
Columbus, Delaware & Marion Elec. Co.	1.00	
Community Traction Co., Toledo	8.12	0.70
Indiana, Columbus & Eastern Trac. Co.		19.90
Lake Shore Elec. Ry.	1.85	2.00
Lima & Toledo R.R.	0.28	13.10
Lorain St. Railroad	0.34	
Lancaster Traction & Power Co.	1.00	
Northern Ohio Pwr. & Lt. Co.	3.55	
Pennsylvania-Ohio Pwr. & Lt. Co.	0.34	
Shenango Valley Trac. Co.	0.32	
Stark Electric R.R.	0.56	
Toledo & Western Ry.	0.38	1.50
Toledo, Fostoria & Findlay Ry.	0.50	
Western Ohio Ry. & Power Corp.	0.40	
West End Trac. Co.		0.72
Oklahoma		
United Service Co., Tulsa	2.00	
Oregon		
Portland Electric Power Co.		1.25
Pennsylvania		
Allegheny Valley Street Railway	0.10	3.30
Altoona & Logan Valley Elec. Ry.	0.70	2.17
Beaver Valley Traction Co.	1.58	
Conestoga Traction Co.	0.20	
Erie Rys.	1.00	
Harrisburg Rys.	0.97	0.25
Johnstown Traction Co.	2.00	
New Castle Elec. St. Ry.	0.50	
Northern Ohio Power & Light Co.	3.55	
Philadephia Rapid Transit Co.	24.69	0.64
Pittsburgh Railways	27.85	4.66
Pittsburgh, Harmony, Butler & New Castle Ry.	1.00	15.00
Reading Transit Co.	1.75	
Scranton Ry.	1.44	0.15
Southern Pennsylvania Traction Co.	0.55	
Valley Rys., Lemoyne	0.63	0.62
Webster, Monessen, Belle Vernon, Fayette City St. Ry.	0.31	
West Penn. Rys.	1.20	0.90
Wilkes-Barre Ry.	1.10	0.63
Williamsport Rys.	0.13	
York Railways	1.09	
Rhode Island		
United Elec. Rys., Providence	7.50	
Tennessee		
Knoxville Power & Light Co.	0.21	
Memphis St. Ry.	8.10	
Nashville Ry. & Lt. Co.	1.45	1.55
Tennessee Electric Power Co.	3.12	
Texas		
Dallas Ry. & Terminal Co.	1.28	0.50
Galveston Elec. Co.	0.59	
Houston Elec. Co.	0.02	0.81
San Antonio Public Service Co.	0.71	3.12
Texas Elec. Ry.	1.00	1.00
Utah		
Salt Lake & Utah R.R.		0.75
Utah Light & Traction Co.	0.20	
Virginia		
Lynchburg Trac. & Lt. Co.	2.00	
Roanoke Ry. & Elec. Co.	0.65	1.28
Virginia Elec. & Pwr. Co.	6.15	1.66
Virginia Public Service Co.	0.19	
Washington		
Gray's Harbor Ry. & Lt. Co.	0.71	
Seattle Municipal St. Ry.	2.70	3.06
Spokane United Rys.	0.77	5.00
Tacoma Ry. & Pwr. Co.	2.92	2.87
West Virginia		
Charleston Interurban R.R.	0.25	
Monongahela West Penn Pub. Serv. Co.	0.32	0.16
Wheeling Traction Company	3.00	1.30
Wisconsin		
Chicago & Milwaukee Elec. Ry.	1.28	
Madison Rys.	0.50	
Milwaukee Elec. Ry. & Lt. Co.	10.52	4.58
Northern States Power Co., Eau Claire	1.00	2.30
Wisconsin Power & Lt. Co.	0.75	
Wisconsin Valley Elec. Co.	0.70	
Hawaiian Islands		
Honolulu Rapid Transit Co.	0.63	
Canada		
British Columbia Elec. Ry.	2.17	1.55
Cape Breton Electric Co.	0.75	
Cornwall St. Ry. Lt. & Power Co.	0.50	
Edmonton Radial Ry.	0.86	
Hamilton St. Ry.	2.00	
Hydro-Electric Rys., Guelph		0.50
Hydro Electric Rys., Kingsville	1.00	
Hydro-Electric Rys., Windsor	1.10	
Lethbridge Municipal St. Ry.		1.00
Levis Tramways	1.50	
London Street Ry.	0.88	
Montreal Tramways	10.37	0.25
New Brunswick Power Co.	0.53	0.38
Nova Scotia Light & Power Co.	0.64	1.26
Ottawa Electric Railway	3.00	
Saskatoon Municipal Ry.	1.00	
Sherbrooke Elec. Ry. & Power Co.	0.60	0.45
Toronto Transportation Commission	5.04	
Winnipeg Elec. Co.	1.32	
Totals	472.07	228.07

City Rapid Transit Company, Mobile Light & Railroad Company, International Railway at Buffalo, Cincinnati Street Railway, Milwaukee Electric Railway & Light Company, Los Angeles Railway, Third Avenue Railway and the Montreal Tramways. Among the interurbans, the Pacific Electric Railway, the Pittsburgh, Harmony, Butler & New Castle, the Boston, Worcester & New York Street Railway, the Indiana, Columbus & Eastern Traction Company, the Lima & Toledo Railroad and the Chicago, Aurora & Elgin Railroad reported more than 10 miles of reconstruction done during the past year.

Less track was permanently abandoned by the electric railways during 1929 than in other recent years. In all, about 750 miles of track was abandoned by companies which continued to operate the major portions of their rail systems. Reasons for such abandonments were the same as those which have actuated similar actions in the past—light traffic which did not produce sufficient revenue to meet operating costs or the necessity to make large expenditures for rehabilitation, or both. In many instances bus operation under the management of the railway was inaugurated to replace the rail service formerly given. In some instances, however, where traffic was extremely thin, it was not deemed advisable to supply service of any kind.

The number of electric railways which abandoned all rail operation was smaller in 1929 than in any other recent year, as was also the mileage involved. Altogether, there were fewer than twenty such companies operating only about 300 miles of track. Among these the West Chester Street Railway, the Burlington Traction Company, the Sioux Falls Traction System and the Hamilton Radial Electric Railway, all replaced their rail service by bus service under their own auspices. The Bethlehem Transit Company abandoned rail operation, and bus service is now furnished by the Lehigh Valley Transit Company. All rail operations were abandoned in the small cities of Plattsburgh, N. Y., and Santa Barbara, Cal., without the substitution of any other organized transportation service. Other complete abandonments of the year include the Manhattan Bridge 3-Cent Line of New York City and the Van Brunt & Erie Basin Railroad in Brooklyn. Prior to their abandonment the service rendered by these companies had been superseded to a large extent by under-river tunnels and rapid transit service.

Analysis of the conditions surrounding the abandonment of some 150 electric railway systems during the past decade shows that the great majority have occurred in small communities. The average size of the population served was approximately 10,000 and the average length of the rail system was about 8.5 miles. Nearly half of

Partial Track Abandonments in 1929

Name of Company	Miles
Alabama	
Birmingham Elec. Co.	0.14
Arizona	
Street Ry., City of Phoenix	5.50
Tucson Rapid Transit Co.	1.01
Arkansas	
Arkansas Pwr. & Lt. Co., Pine Bluff	0.20
California	
Key System Transit Co.	9.32
Market St. Ry., San Francisco	0.10
Pacific Coast Ry., San Luis Obispo	0.44
Pacific Elec. Ry.	10.54
Peninsular Ry., San Jose	2.00
Sacramento Northern Ry.	0.13
San Diego Elec. Ry.	1.30
Colorado	
Denver Tramway	11.76
Connecticut	
Connecticut Co.	42.49
New Haven & Shore Line Elec. Ry.	18.13
Delaware	
Delaware Elec. Power Co.	11.76
District of Columbia	
Washington Ry. & Elec. Co.	0.05
Florida	
Gulf Power Co., Pensacola	1.81
Jacksonville Trac. Co.	1.26
Georgia	
Columbus Elec. & Pwr. Co.	0.90
Georgia Power Co., Rome	1.60
Savannah Electric & Power Co.	2.51
Illinois	
Alton Ry.	4.18
Chicago & Illinois Valley R.R.	14.39
Chicago & Joliet Elec. Ry.	1.00
Illinois Power & Light Corp., Bloomington	0.98
Illinois Power & Light Corp., Galesburg	1.50
Illinois Power & Light Corp., Quincy	15.94
Rockford, Beloit & Janesville Elec. Ry.	10.00
Indiana	
Indiana, Columbus & Eastern Traction Co.	8.37
Interstate Public Service Co.	2.16
Northern Indiana Power Co.	0.25
Union Traction Co.	0.65
Iowa	
Mississippi Valley Elec. Co., Iowa City	1.00
Omaha & Council Bluffs Ry. & Bridge Co.	0.77
Tri-City Ry. of Iowa	1.74
Kansas	
Kansas Power & Light Co., Topeka	8.24
Kentucky	
Kentucky Utilities Co., Paducah	2.20
Louisville Ry.	0.28
Louisiana	
New Orleans Public Service, Inc.	13.76
Orleans-Kenner Trac. Co.	3.61
Maine	
Androscoggin & Kennebec Ry.	16.22
York Utilities Co.	32.68
Maryland	
Potomac Edison Co.	10.09
United Rys. & Elec. Co., Baltimore	6.33
Massachusetts	
Berkshire St. Ry.	2.73
Boston El. Ry.	19.54
Eastern Mass. St. Ry.	16.81
Fitchburg & Leominster St. Ry.	5.00
Massachusetts Northeastern St. Ry.	18.17
Middlesex & Boston St. Ry.	22.77
Worcester Consolidated St. Ry.	17.40
Michigan	
Dept. of Street Rys., Detroit	2.07
Lake Superior Dist. Pwr. Co., Ironwood	5.54
Minnesota	
Duluth St. Ry.	0.31
Twin City Rapid Transit Co.	0.26
Missouri	
City Light & Traction Co., Sedalia	0.45
Kansas City Public Service Co.	0.14
St. Louis Public Service Co.	4.26
Nebraska	
Omaha & Council Bluffs St. Ry.	0.19
New Jersey	
Coast Cities Railway	13.32
New York	
Fonda, Johnstown & Gloversville R.R.	4.05
International Ry, Buffalo	4.57
New York Rys.	0.15
New York State Rys., Oneida	1.71
New York State Rys., Rochester	44.86
New York State Rys., Utica	1.42
Niagara Junction Ry.	0.25
Ogdensburg St. Ry.	1.70
Steinway Railway	0.05
Third Avenue Ry.	20.04
United Traction Co., Albany	4.19
Ohio	
Cincinnati St. Ry.	1.60
Cleveland Ry.	6.15
Columbus Ry., Pwr. & Lt. Co.	3.47
Community Traction Co., Toledo	7.29
New Castle & Lowell Ry.	0.26
Northern Ohio Power & Light Co.	65.04
Ohio River Ry. & Pwr. Co.	9.29
Pioneer Transportation, Inc.	1.75
Youngstown Municipal Ry.	4.84
Oklahoma	
Northeast Oklahoma R.R.	0.60
Oklahoma Union Ry.	13.51
Pennsylvania	
Beaver Valley Traction Co.	0.06
Conestoga Traction Co.	0.17
Harrisburg Rys.	0.31
New Castle Elec. St. Ry.	0.32
Philadelphia Rapid Transit Co.	2.15
Pittsburgh Railways	2.17
Reading Transit Co.	0.25
Scranton Ry.	0.72
Valley Rys., Lemoyne	0.25
Rhode Island	
United Elec. Rys., Providence	44.90
Texas	
Eastern Texas Elec. Co.	0.68
Northern Texas Traction Co.	3.70
San Antonio Public Service Co.	2.57
Utah	
Utah Light & Traction Co.	5.71
Virginia	
Lynchburg Trac. & Lt. Co.	0.25
Petersburg, Hopewell & City Point Ry.	3.00
Roanoke Ry. & Elec. Co.	1.05
Virginia Elec. & Pwr. Co.	7.38
Virginia Public Service Co.	0.07
Washington	
Pacific Northwest Traction Co.	8.94
Seattle Municipal St. Ry.	6.12
Spokane, Coeur d'Alene & Palouse Rys.	0.40
Tacoma Ry. & Power Co.	20.66
Yakima Valley Transportation Co.	9.04
West Virginia	
Monongahela West Penn. Pub. Serv. Co.	22.28
Wisconsin	
Milwaukee Elec. Ry. & Lt. Co.	10.98
Wisconsin Public Service Corp.	21.22
Canada	
London Street Ry.	1.25
Montreal Tramways	0.90
Niagara, St. Catherines & Toronto Ry.	0.10
Oshawa Ry.	0.02
Winnipeg Elec. Co.	0.79
Total	766.45

these companies and half of the total miles of track were in towns having an average population of less than 5,000 persons. Only 10 per cent of the abandoned railways were located in towns of over 20,000 population.

A considerable number of other abandoned electric railway systems were so located that exact determination of the population served is impossible. From the fact that in many instances no organized transportation service has replaced the abandoned rail service, however, it may be inferred that the population formerly served by these lines also was exceedingly small.

Bus service has replaced rail service over about two-thirds of the abandoned mileage. In many instances this is being given by the same management which formerly gave rail service, but in some instances new management has come in. On some 1,300 miles of track where the traffic was so light that it became necessary to discontinue rail service, no organized transportation service of any kind is now given.

Entire Electric Railway Properties Abandoned in 1929

Name of Company	Miles of Track
Atlantic City & Suburban Ry.	16.00
Augusta-Aiken Railway	25.10
Bethlehem Transit Co.	7.25
*Burlington Rapid Transit Co.	16.50
Commission of Public Docks, Portland, Ore.	1.50
Detroit, Jackson & Chicago Ry.	69.14
*Hamilton Radial Elec. Ry.	18.00
Lima & Defiance R.R., Ohio	45.00
Lowell & Fitchburg St. Ry.	13.22
Manhattan Bridge 3c. Line	4.50
Plattsburgh Traction Co.	7.58
Puget Sound Power & Light Co., Southern District	6.66
Santa Barbara & Suburban Ry.	8.99
*Sioux Falls Traction System	14.50
*Vermont Co.	12.02
Van Brunt Street & Erie Basin R.R.	2.78
Warren & Jamestown St. Ry.	20.38
*West Chester Street Railway	28.00
Total	317.12

* Bus service substituted under same management.

Rapid Transit Situation Shows Little Change

New York, Boston, Philadelphia and Chicago are the only ones in which regular high-speed subway and elevated service is given

NOTWITHSTANDING widespread interest in transit in many cities, there are only four metropolitan centers in the United States where lines devoted exclusively to rapid transit passenger movement has been constructed. These are New York, Boston, Philadelphia and Chicago. The accompanying table gives the route and track mileages and the number of cars operated, as compiled from available sources.

New York, on account of the immense concentration of population in a limited area, naturally has the greatest rapid transit mileage. Two separate companies give both subway and elevated service in the boroughs of Manhattan, Brooklyn and Queens. The Interborough system alone operates in the Bronx, and the Staten Island Rapid Transit Company, which is an electrification of the steam railroad which has been in operation for many years, serves the Borough of Richmond (Staten Island). Besides these lines, the Hudson & Manhattan Railroad, popularly known as the Hudson Tubes, operates an underground system beneath Sixth Avenue, Manhattan, which crosses the Hudson River to reach points in Jersey City and Hoboken. A second route runs from the Hudson Terminal at Church and Dey Streets, Manhattan, to Jersey City and continues on surface tracks of the Pennsylvania Railroad to Newark. While the Hudson & Manhattan is an interstate line, and as such comes under the supervision of the Interstate Commerce Commission, its service differs but little from rapid transit.

For years the Long Island Railroad has been serving the urban population of New York City with suburban transit. It operates into the heart of Manhattan and supplements to a large extent the subway and elevated lines. The same is true to a lesser extent of the suburban services of the New York Central, New York, New Haven & Hartford, and New York, Westchester & Boston.

In Boston the rapid transit service is given by the trains of the Boston Elevated Railway. In addition there are several routes of surface cars operating on elevated or subway tracks. The most important of these is the Boylston Street subway, which runs from Kenmore to Park Street at the edge of the Boston Common. Another route runs on an elevated track from Lechmere Square to North Station, the surface cars continuing into the Tremont Street Subway to Park Street.

The Boston, Revere Beach & Lynn Railroad is a narrow-gage line operating on its own right-of-way between East Boston and Lynn, Mass. Its method of operation differs but little from the rapid transit lines of the Boston Elevated Railway, and for that reason it is included.

Data on Rapid Transit Lines in United States

	Route Miles — Subway	Route Miles — Elevated	Total Track Miles	Cars
Chicago, Ill.				
Chicago Rapid Transit Co.	0.0	81.1	229.5	1,797
Boston, Mass.				
Boston Elevated Railway	12.2	10.0	57.5	528
Boston, Revere Beach & Lynn R.R.	0.0	13.8*	31.0	96
New York, N. Y.				
Brooklyn-Manhattan Transit Co.	41.66		280.6	1,939
Interborough Rapid Transit Co.	44.6	116.6	356.7	3,712
Hudson & Manhattan R.R.	8.5	0.0†	20.0	305
Staten Island Rapid Transit Co.	0.0	21.6*	44.7	100
Philadelphia, Pa.				
Philadelphia Rapid Transit Co.				
Market St.-Frankford Elevated	2.6	11.8	39.0	215
Broad St. Subway	6.1	0.0	20.9	150

*Operates a high-speed line on the surface on private right-of-way.
†Operates a subway line and leases a high-speed surface line on the private right-of-way of the Pennsylvania Railroad to Newark, N. J.

Besides these lines there are several instances where electric railways and electrified steam lines give service comparable with that already described. The Northwestern Pacific Railroad, and the Key System Transit Company, operating across the bay from San Francisco, are examples of this class of service. The Illinois Central Railroad runs a suburban service in the city of Chicago and its suburbs that is comparable to rapid transit. Beginning in the near future certain lines centering in the Cleveland Union Terminal will furnish suburban service, principally within the city of Cleveland, differing but little from rapid transit.

In the city of Cincinnati a rapid transit subway has been constructed, but the stations never have been built nor track laid. For that reason it is impossible to include it in the tabulation.

Bus Operations *Are Steadil*

By

J. R. STAUFFER

Assistant Editor *Electrical Railway Journal*

CONTINUED activities in the co-ordination of bus and trolley operations, substitution of buses for cars on small, unprofitable lines that did not warrant rehabilitation, and the merging of numerous independent units into stronger unified systems were the dominant features in the development of bus operations by electric railways in 1929.

These adjustments involved the purchase of nearly 2,200 buses during the past year and the extension and installation of bus routes of approximately 4,000 miles, bringing the total number of buses now operated by the electric railways of the United States and Canada to 12,451 and the total number of bus-miles covered to 24,937. In comparison with the 1928 survey, purchases of bus equipment were slightly lower in 1929, but extensions to bus mileage were greater, excluding the mileage added in 1928 by the Southern Pacific Motor Transport Company in special long-haul service.

Bus Operation by Electric Railways and Subsidiary Companies

	No. Buses Jan. 1, 1930
Alabama	
Alabama Power Co. { Gadsden	4
Alabama Power Co. { Sheffield	2
Birmingham Electric Co.	4
*Selma Electric Ry.	5
Arizona	
Phoenix Street Ry.	2
Tucson Rapid Transit Co.	5
*Warren Co.	6
Arkansas	
Arkansas Power & Light Co.	11
Intercity Terminal Railway	9
California	
Bakersfield & Kern Electric Ry.	5
Eureka Street Ry.	1
Key System Transit Co.	64
Los Angeles Ry.	189
Los Angeles Motor Bus Co.	67
Market Street Ry.	6
Municipal Ry. of San Francisco	18
Pacific Electric Ry.	132
Pacific Gas & Electric Co.	11
Peninsular Ry.	8
Sacramento Northern Ry.	1
San Diego Electric Ry.	30
San Francisco, Napa & Calistoga R.R.	2
Napa Valley Bus Co.	
San Jose Railroads	1
Southern Pacific Co. (Electric Division)	52
*Union Traction Co., Santa Cruz	5
Colorado	
Colorado Springs & Interurban Ry.	5
*Denver & Interurban Motor Co.	10
*Denver & South Platte Transportation Co.	2
Denver Tramway	22
Bus Transportation Co.	
Fitzsimons Bus & Taxi Co.	
Grand River Valley Ry.	2
Public Service Co. of Colo.	5
Connecticut	
Connecticut Co.	165
*Danbury Power & Transportation Co.	17
*Groton & Stonington Traction Co.	14
*Lordship Ry.	5
New Haven & Shore Line Ry.	13
Waterbury & Mildale Tramway	3
Delaware	
Delaware Electric Power Co.	22
Delaware Bus Co.	
District of Columbia	
Capital Traction Co.	42
Washington Ry. & Electric Co.	101
Washington & Old Dominion Ry.	1
Florida	
Jacksonville Traction Co.	4
*Key West Electric Co.	5
Miami Beach Ry.	50
Municipal Ry. of St. Petersburg	8
Tampa Electric Co.	23
Georgia	
Columbus Electric & Power Co.	22
Columbus Transportation Co.	
Georgia Power Co.	29
Atlanta Coach Co.	
Savannah Electric & Power Co.	18
Idaho	
*Boise Street Car Co.	11
Illinois	
Alton Ry.	5
Aurora, Elgin & Fox River Electric Co.	5
*Central Illinois Public Service Co. { Charleston	2
*Central Illinois Public Service Co. { Springfield	9
*Central Illinois Traction Co.	3
Chicago, Aurora & Elgin R.R.	10
Western Motor Coach Co.	
Chicago City Ry.	3
Chicago & Illinois Valley R.R.	10
Chicago & Joliet Electric Ry.	10
Chicago & Joliet Transportation Co.	
Chicago, North Shore & Milwaukee R.R.	85
Metropolitan Motor Coach Co.	
Chicago Ry.	5
Chicago & West Towns Ry.	46
East St. Louis & Suburban Ry.	5
East St. Louis Ry.	13
Evanston Ry.	27
Evanston & Niles Center Bus Co.	
Illinois Power Co.	19
Illinois Power & Light Corp.	139
Illinois Terminal R.R.	18
*Joliet, Plainfield & Aurora Transp. Co.	6
Kewanee Public Service Co.	2
Rockford Electric Co.	26
Rockford & Interurban Ry.	10
Tri-City Ry. of Ill.	5
Indiana	
Beech Grove Traction Corp.	8
Chicago, South Bend & Northern Indiana Ry.	25
Chicago, South Shore & South Bend R.R.	108
Shore Line Motor Coach Co.	
Evansville & Ohio Valley Ry.	10
Gary Railways	5
Indianapolis, Columbus & Southern Trac. Co.	2
Indianapolis Street Ry.	27
Peoples Motor Coach Co.	
Indianapolis & Southeastern R.R.	8
Indiana Service Corp.	12
Interstate Public Service Co.	32
Northern Indiana Power Co.	5
Southern Indiana Gas & Electric Co.	17
Southern Michigan Ry.	3
Terre Haute, Indianapolis & Eastern Trac. Co.	50
Indiana Motor Transit Co.	
T. H. I. & E. (Terre Haute Div.)	19
Union Traction Co. of Indiana	51
Iowa	
Cedar Rapids & Iowa City R.R.	8
Clinton, Davenport & Muscatine Ry.	3
Des Moines & Central Iowa R.R.	3
*Des Moines Electric Light Co.	6
Fort Dodge, Des Moines & Southern R.R.	37
Ft. Dodge, Des Moines & South. Transp. Co.	
Fort Madison Street Ry.	2
Interstate Power Co.	9
*Iowa Railway & Light Co., Marshalltown	9
Iowa Southern Utilities Co.	
Burlington	22
Centerville	3
Ottumwa	6
Mississippi Valley Electric Co.	5
Waterloo, Cedar Falls & Northern Ry.	11
Tri-City Ry.	15
Kansas	
Arkansas Valley Interurban Ry.	12
Arkansas Valley Transportation Co.	
Kansas City, Leavenworth & Western Ry.	13
Leavenworth Transportation Co.	
Kansas Power & Light Co.	39
Kansas Public Service Co.	2
Salina Street Ry.	2
United Power & Light Corp.	3
Wichita Railroad & Light Co.	50
Wichita Motor Bus Co.	
Kentucky	
Kentucky Traction & Terminal Co.	29
Kentucky Coach Co.	
Consolidated Coach Corp.	
Kentucky Utilities Co.	12
Louisville Ry.	43
Kentucky Carriers, Inc.	
Louisiana	
Baton Rouge Electric Co.	3
*Louisiana Elec. Co.	7
Municipal Street Ry., Alexandria	12
New Orleans Public Service, Inc.	39
Maine	
York Utilities Co.	5
Maryland	
*Cumberland & Westernport Transit Co.	13
Potomac Edison Co.	93
Blue Ridge Transportation Co.	
United Rys. & Electric Co.	122
Baltimore Coach Co.	
Washington, Baltimore & Annapolis Elec. R.R.	3
Massachusetts	
Berkshire Street Ry.	4
Boston Elevated Ry.	319
Boston, Revere Beach & Lynn Ry.	2
Point Shirley St. Ry. Co.	
Boston, Worcester & New York Street Ry.	11
Eastern Massachusetts Street Ry.	90
East Taunton Street Ry.	2
Fitchburg & Leominster Street Ry.	7
*Gardner-Templeton Street Ry.	9
Holyoke Street Ry.	3
Interstate Street Ry.	14
Middlesex & Boston Street Ry.	98
*Milford, Framingham, Hopedale & Uxbridge Coach Co.	7
Northampton Street Ry.	4

(*Table Continued on page 22*)

Expanded by Electric Railways

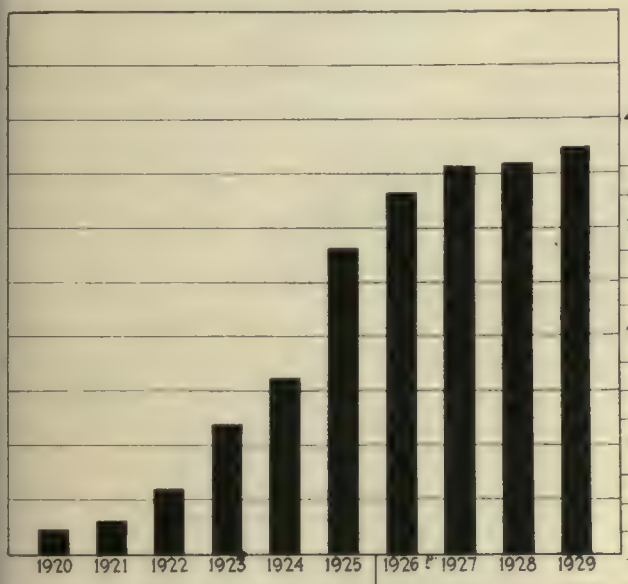
Purchases of new buses and extensions of bus mileage during the past year denote normal and healthy progress. Almost 2,200 buses were bought and nearly 4,000 miles of route was added

Of the 2,194 buses bought last year, 1,813 were new equipment while 381 were used and were acquired, in most cases, in the absorption of independent bus companies by the railways. Similarly, the figure of 775 buses which were sold or scrapped during the year includes a large number of transferred equipment as a result of the merging of interests.

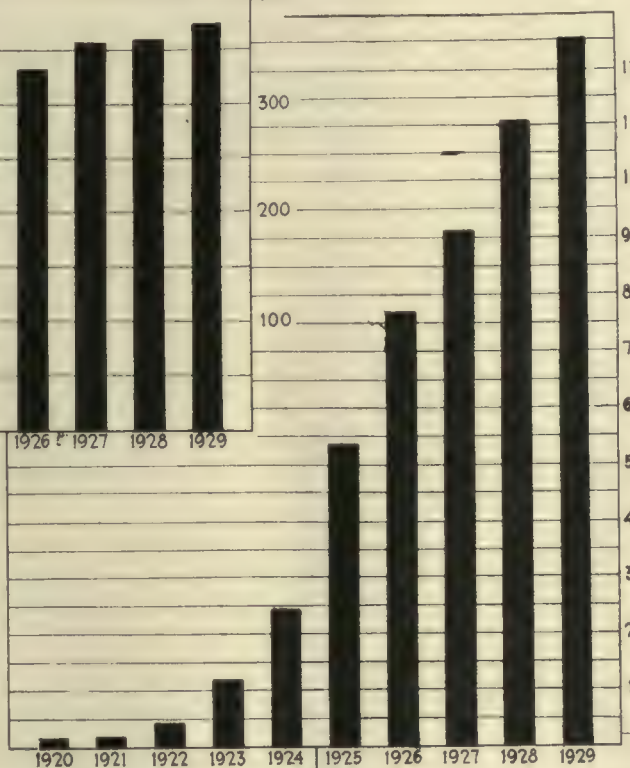
Still maintaining its position as the largest operator of motor buses in the United States, Public Service Co-ordinated Transport, of New Jersey, increased its fleet to a total of 2,337 buses. During 1929 this company purchased 638 buses, of which 374 were new and 264 were second-hand. Practically all of these buses were of the semi-deluxe or deluxe, 29 to 33-passenger type. Approximately 1,100 miles of bus routes was added to the existing routes, bringing the total to 2,852 miles.

Other large purchasers of bus equipment were: United Electric Railways, Providence, R. I., which bought 72 new buses from 29 to 37-passenger capacity; Toronto Transportation Commission, which added 51 buses ranging in seating capacity from 17 to 33 passengers; New York State Railways, which purchased 50 buses of the 30 to 38-passenger type; Northern Ohio Power & Light, which bought 46 buses of large seating capacity and the Manila Electric Company, which more than doubled its fleet, adding 46 new small type buses to the 36 it already owned. The Boston Elevated Railway, Detroit Street Railways, Cleveland Railway, Virginia Electric & Power Company and the Third Avenue Railway in New York each purchased more than 25 new buses during 1929.

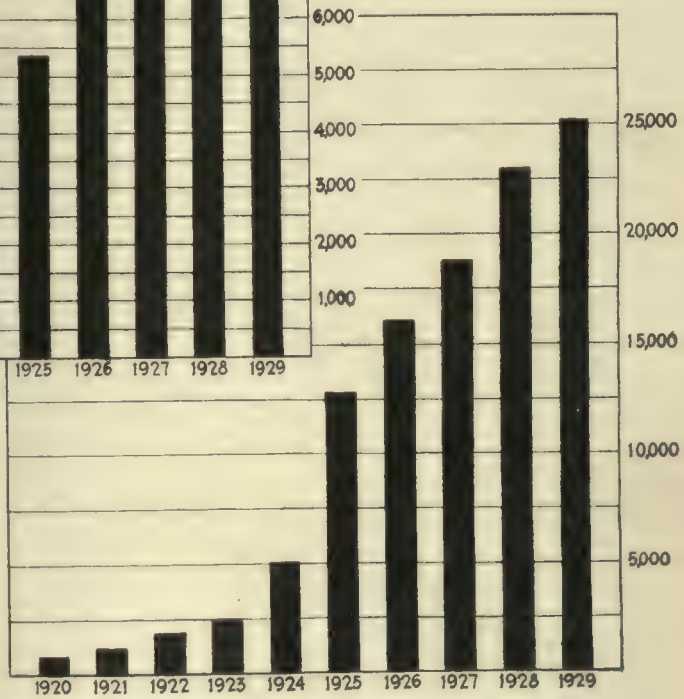
Bus mileage changes during the year include 3,825 miles of extensions and 670 miles of abandoned route. Of the extensions made, only 425 miles replaced former trolley operations, and in almost every case substitution of bus service was made on lines which were due for renewal of tracks or subject to municipal paving demands. The Wheeling Traction Company, through its acquisition of the White Star Lines, extended its bus operations by 197 miles; Wisconsin Power & Light Company extended its bus routes 168 miles, replacing all trolley car service in the city of Janesville, Wis., and 1.75 miles in Oshkosh, Wis. An exchange was made with the Royal Rapid Bus Company whereby three lines—Berlin to Juneau, 51 miles; Plymouth to Elkhart Lake, 7 miles, and Madison to Prairie du Sac. 35 miles—were traded for a 114-mile route from Madison, Wis., to Dubuque, Iowa. The Potomac Edison Company extended its routes 150 miles with bus service, of which 6.69 miles replaced trolley car route; Northern Ohio Power & Light Company extended its bus opera-



Additional electric railways which inaugurated bus service during the year bring the total to 370



Electric railways are now operating more than 12,000 buses



Substantial extensions to bus service in 1929 increase the mileage to 25,000

Bus Operations by Electric Railways and Subsidiary Companies—(Continued)

	No. Buses Jan. 1, 1930
*Plymouth & Brockton Street Ry	11
Springfield Street Ry	52
Union Street Ry	18
Worcester Consolidated Street Ry	62
Michigan	
City of Detroit, Department of Street Rys	533
Eastern Michigan Railways	352
Eastern Michigan Motor Buses	
*Grand Rapids, Grand Haven & Muskegon Ry	6
Grand Rapids R.R	13
Jackson Transportation Co	50
Southern Michigan Transportation Co.	
Kalamazoo Transportation Co	9
Lansing Transportation Co	19
*Menominee & Marinette Light & Traction Co	15
Muskegon Traction & Lighting Co	2
Saginaw Transit Co	37
Minnesota	
Duluth Street Ry	16
Duluth Superior Coach Co.	
Twin City Rapid Transit Co	101
Twin City Motor Bus Co.	
Mississippi	
Mississippi Power Co.	
(Gulfport Division)	35
*(Hattiesburg Division)	7
*(Meridian Division)	7
Mississippi Power & Light Co.	
*(Greenville Division)	4
(Vicksburg Division)	3
Missouri	
City Light & Traction Co	3
Kansas City, Clay County & St. Joseph Ry	12
Kansas City, Clay County & St. Joseph Auto Transit Co.	
Kansas City Public Service Co	76
Missouri Power & Light Co	2
Springfield Traction Co	14
St. Joseph Ry., Lt., Ht. & Pwr. Co	20
St. Louis Public Service Co	52
Montana	
Butte Electric Ry	5
Nebraska	
Lincoln Traction Co	22
Omaha & Council Bluffs Street Ry	32
New Hampshire	
*Dover, Somersworth & Rochester St. Ry	6
*Keene Electric Ry	7
*Laconia Street Ry	11
Laconia Transit Co.	
Nashua Street Ry	5
*Portsmouth Electric Ry	12
New Jersey	
Atlantic City & Shore R.R	34
Coast Cities Ry	33
Cumberland Traction Co	2
Five-Mile Beach Ry	6
*New Jersey Inter-Urban Co	10
Ocean City Electric R.R	1
Public Service Co-Ordinated Transport	2,337
Trenton Transit Co	35
New York	
Black River Traction Co	16
Watertown Transportation Co.	
Brooklyn & Queens Transit Corp	28
Brooklyn Bus Corp.	
Buffalo & Erie Ry	6
Buffalo & Erie Coach Company	
Cortland County Traction Co	3
Cortland County Bus Lines	
Eastern New York Utilities Corp	3
Eastern New York Transportation Co.	
Empire State Rys	6
Mid-State Coach Lines	
Fonda, Johnstown & Gloversville R.R	5
*Geneva, Seneca Falls & Auburn R.R	3
Hamburg Railway	16
*Hudson Valley Ry	24
Hudson Transportation Co.	
*Huntington Traction Co	5
Huntington Coach Corp.	
International Ry	90
International Bus Corp.	
Jamestown Street Ry	21
Jamestown Motor Bus Transportation Co.	
Kingston Consolidated R.R	8
Kingston City Transportation Co.	
*Newburgh Public Service Co	22
*New York & Stamford Ry	62
County Transportation Co.	
New York State Rys. (Rochester)	84
Rochester Interurban Bus Co.	
Rochester Rys. Co-Ord. Bus Lines.	
East Ave. Bus Co.	
Darling Bus Line.	
New York State Rys. (Syracuse)	32
Syracuse Rys. Co-Ord. Bus Line.	
New York State Rys. (Utica)	14
Utica Rys. Co-Ord. Bus Line.	
Niagara Gorge R.R	6
Niagara Gorge Bus Line	
*Peekskill Lighting & R.R. Corp	29
Peekskill Motor Bus Corp.	
*Port Jervis Transit Co	2
Poughkeepsie & Wappingers Falls Ry	6
Rochester & Syracuse R.R	1
Mid-State Coach Lines.	
Schenectady Ry	24
Schenectady Rapid Transit Co.	
Syracuse & Eastern R.R	6
Syracuse & Eastern Bus Lines.	
Southern New York Ry	4
Manson Transportation Co.	
Third Ave. Ry	184
Surface Transportation System	
Triple Cities Traction Co	20
Binghamton Ry. Bus Line	
United Traction Co	90
Capitol District Transp. Co.	
*Walkill Transit Co	8
Waverly, Sayre & Athens Trans. Co	5
North Carolina	
Carolina Power & Light Co	3
Durham Public Service Co	19
North Carolina Public Service Co	16
Greensboro Bus Co.	
Southern Public Utilities Co	20
Tidewater Power Co	2
Coast City Transit Co.	
North Dakota	
Northern States Power Co	4
Northern Transit Co.	
Ohio	
City of Ashtabula—Division of Street Rys	4
Cincinnati Hamilton & Dayton Ry	4
Blue Bus Co.	
Cincinnati, Lawrenceburg & Aurora Electric Street Ry	7
Cincinnati Street Ry	98
Cleveland Ry	187
Cleveland, Southwestern Ry. & Light Co	19
Southwestern Bus Co.	
Columbus, Delaware & Marion Elec. Co	4
Columbus Railway, Power & Light Co	6
Community Traction Co	128
Dayton Street Ry	3
Dayton & Xenia Ry	2
Indiana, Columbus & Eastern Traction Co	20
Dayton & Columbus Transportation Co.	
Lake Shore Electric Ry	3
Lorain Street Ry	8
Maumee Valley Co	13
Maumee Valley Transp. Co.	
Nelsonville-Athens Electric Ry	1
Nelsonville Transp. Co.	
Northern Ohio Power & Light Co	283
Ohio Public Service Co	5
Penn-Ohio Public Service Corp	34
Pioneer Transportation Co	50
Columbus & Zanesville Transp. Co.	
Portsmouth Public Service Co	11
Springfield Ry	1
Steubenville, East Liverpool & Beaver Valley Traction Co	3
West End Traction Co	10
Youngstown Municipal Ry	69
Youngstown & Suburban Ry	13
Youngstown & Suburban Transportation Co.	
Columbiana Bus Co.	
Youngstown Suburban Tourist Lines.	
Oklahoma	
Northern Oklahoma R.R	2
Oklahoma Ry	48
Oklahoma Union Ry	83
Union Transportation Co.	
*Shawnee-Tecumseh Traction Co	12
United Service Co	7
Oregon	
Commission of Public Docks, Portland	1
Oregon Electric Ry	1
Portland Electric Power Co	48
Oregon City Motor Bus Co.	
Pennsylvania	
Allentown & Reading Traction Co	3
Altoona & Logan Valley Electric Ry	23
Logan Valley Bus Co.	
Beaver Valley Traction Co	9
Beaver Valley Motor Coach Co.	
*Berwick & Nescopeck St. Ry	2
*Chambersburg & Shippensburg Ry	6
Cumberland Valley Transp. Co.	
*Citizens Traction Co	33
Citizens Transit Co.	
Conestoga Traction Co	4
Conestoga Transp. Co.	
East Penn Traction Co	9
East Penn Transportation Co.	
Erie Ry	24
Erie Coach Co.	
Johnstown & Somerset Ry	1
Johnstown Traction Co	34
Traction Bus Co.	
Southern Cambria Bus Co.	
Beaverdale and South Fork Bus Co.	
Lackawanna & Wyoming Valley R.R	5
Laurel Line Bus Co.	
Lehigh Traction Co	14
Hazleton Auto Bus Co.	
Lehigh Valley Transit Co	22
Lehigh Valley Transportation Co.	
Lewiston & Reedsville Electric Ry	9
Lewiston Transportation Co.	
*Lewisburg, Milton & Watsonville Pass. Ry. Co.	3
*North Branch Bus Co	10
Philadelphia & Westchester Traction Co	33
Philadelphia Rapid Transit Company	340
Philadelphia Rural Transit Co.	
Pittsburgh Rys	86
Pittsburgh Motor Coach Co.	
Pittsburgh, Mars & Butler Ry	
Pittsburgh, Harmony, Butler & New Castle Ry	7
Harmony Short Line Motor Transport Co.	
*Pocono Motor Coach Co	10
Reading Transit Co	6
Schuylkill Transportation Co	16
Scranton, Montrose & Binghamton Ry	2
Scranton Ry	19
Scranton Bus Co.	
Shamokin & Edgewood Elec. Ry	9
Shamokin & Treverton Bus Line.	
Shamokin & Mt. Carmel Transportation Co	3
Ashland & Centralia Auto Bus Co.	
Southern Penn Traction Co	35
Southern Penn Bus Co.	
*United Traction Street Ry	2
Dubois Transit Co.	
*West Chester Street Ry	35
Chester Valley Bus Line	
Westmoreland County Ry	6
Chestnut Ridge Transp. Co.	
West Penn Rys	25
Penn Bus Lines.	
Ohio Valley Transit Co.	
Westside Electric Rys	5
Westside Motor Transit Co.	
Wilkes-Barre Ry	33
Wyoming Valley Autobus Co.	
Williamsport Railways	3
Williamsport Transportation Co.	
Woodlawn & Southern Street Ry	6
Rhode Island	
*Newport & Providence Ry	34
United Electric Rys	130
South Carolina	
South Carolina Gas & Electric Co	8
Spartanburg Bus Co.	
Southern Public Utilities	1
South Dakota	
*Sioux Falls Traction System	27
Tennessee	
Knoxville Power & Light Co	6
Nashville Interurban Ry	9
Interurban Bus Co.	
Nashville Railway & Light Co	18
Tennessee Electric Power Co	15
Union Traction Co	1
Texas	
Abilene Traction Co	5
Austin Street Ry	9
Bryan College Traction Co	2
Dallas Ry. & Terminal Co	25
Eastern Texas Electric Co	25
J. G. Holtzclaw Bus Line.	
El Paso Electric Co	7
Houston Electric Co	75
Northern Texas Traction Co	27
Nueces Ry	6
*Rio Grande Valley Traction Co	5
San Antonio Public Service Co	88
*Southwestern Transit Co	4
Texas Electric Ry	6
Wichita Falls Traction Co	11
Utah	
Bamberger Electric R.R	2
Bamberger Transportation Co.	
Utah Light & Traction Co	18
Utah-Idaho Central R.R	5
Utah Rapid Transit Co	1
Vermont	
*Burlington Rapid Transit Co	10
*Twin State Gas & Electric Co	3
Virginia	
Lynchburg Traction & Light Co	3
Petersburg, Hopewell & City Point Ry	3
Roanoke Railway & Electric Co	7
Virginia Electric & Power Co	229
Virginia Public Service Co	5
Citizen's Rapid Transit Corp.	

Bus Operations by Electric Railways and Subsidiary Companies—(Concluded)

	No. Buses Jan. 1, 1930
Washington	
Grays Harbor Ry. & Light Co.	13
North River Transportation Co.	
Twin City Transit Co.	
Lewiston-Clarkson Transit Co.	4
Puget Sound Power & Light Co.	41
North Coast Trans. Co.	
Portland-Seattle Stage Co.	
Pacific Northwest Traction Co.	
Seattle Municipal St. Ry.	48
Seattle & Rainier Valley Ry.	2
Tacoma Municipal Belt Line	1
Tacoma Ry. & Power Co.	23
Tacoma Bus Co.	
Yakima Valley Transportation Co.	3
West Virginia	
Charleston Interurban R.R.	6
Midland Trail Transit	
New River Transit	
Red Bird	
Monongahela-West Penn Public Service Co.	48
Monongahela Transport Co.	
Ohio Valley Electric Ry.	18
Ohio Valley Bus Co.	
Wheeling Public Service Co.	4
Bus Transportation Co.	
Wheeling Traction System	52
Ohio Valley Transit Co.	
Wisconsin	
Madison Rys.	9
Milwaukee Electric Ry. & Light Co.	169
Wisconsin Motor Bus Lines.	
Mississippi Valley Public Service	2
Wisconsin Gas & Electric Co.	11
Wisconsin Michigan Power Co.	20
Intercity Bus Company	
Wisconsin Power & Light Co.	74
Wisconsin Public Service Corp.	18
Wisconsin Valley Electric Co.	7
Valley Transit Co.	
Wyoming	
*Cheyenne Motor Bus Co.	9
Hawaii	
Honolulu Rapid Transit Co.	12
Philippine Islands	
Manila Electric Co.	82
Porto Rico	
Ponce Electric Co.	4
Canada	
Brantford & Hamilton Electric Ry.	5
Brantford Municipal Ry.	1
British Columbia Electric Ry.	23
British Columbia Transit Co.	
Dominion Power & Transmission Co.	5
Grand River Ry.	3
Canadian Pacific Transport Co.	
Hamilton, Grimsby & Beamsville Electric Ry.	7
Hamilton Street Ry.	28
Hydro-Electric Rys.	17
Levis Tramways	1
London Street Ry.	11
Montreal Tramways	100
Moose Jaw Electric Ry.	3
New Brunswick Power Co.	1
Niagara, St. Catherines & Toronto Ry.	3
Ottawa Electric Ry.	14
Pictou County Electric Co.	4
Quebec Railway Light & Power Co.	12
Sherbrooke Ry. & Power Co.	4
Toronto Transportation Commission	206
Gray Coach Lines.	
Winnipeg Electric Ry.	48
*Woodstock, Thames Valley & Ingersoll Electric Ry.	3

tions 150 miles, 37.9 miles of which replaced trolley service, and the Boston Elevated Railway added 84 miles to its bus routes during the year.

Abandonment of all railway operations in favor of bus service is reported by the following companies, the substitution having been completed this year. The Atlantic and Suburban Railway, Atlantic City, N. J., discontined operation with the abandonment and subsequent sale of its line between Absecon and Somers Point via Pleasantville. The Atlantic City & Shore Railroad is now operating a bus line over this route. The Bethlehem Transit Company ceased operating on Jan. 12, 1929, and most of its track was taken up during the summer months. The Lehigh Valley Transit Company began bus operations in this territory on Jan. 22. In South Carolina, the Augusta-Aiken interurban line was acquired by the South Carolina Power Company through a merger and abandoned in July of this year. Augusta has electric railway service supplied by the Georgia Power Company, while the service between Augusta and Aiken as well as to other points in the Southeastern states is supplied by the independent Camel City Coach Company. In Pennsylvania, the West Chester Street Railway discontinued its entire railway operations on Dec. 1, 1929, and abandoned 28 miles of single track. The Chester Valley Bus Lines, which always has been closely identified with the railway, is now operating bus service in lieu of that formerly given by the trolley. Likewise, the Burlington Rapid Transit Company in Vermont, the Sioux Falls Traction Company in South Dakota, Hamilton Radial Railway in Canada, Puget Sound Power & Light Company, Chehalis, Wash., and the Vermont Company have abandoned all railway operations and through a subsidiary or affiliated bus company have substituted bus service. Included in the total number of bus operating railways are 55 companies which have abandoned all rail service. These companies operate 620 buses on 1,650 miles of route.

The Arkansas Valley Interurban Railway, Wichita, Kan., sold a bus line of 76.5 miles to an operating company with a contract for joint rates and interchange of business, and the Northeast Oklahoma Railroad suspended its bus operations entirely. A small number of other companies abandoned some negligible bus mileage on lines that had been extended into new territory and later proved financially unsatisfactory.

In contrast to these abandonments, ten companies inaugurated bus operations for the first time. The Street Railway of Phoenix, Ariz., purchased buses to cover a new route of 7.75 miles; City Light & Traction Company, Sedalia, Mo., replaced 7.2 miles of car route with buses; the Berkshire Street Railway, Pittsfield, Mass., substituted 21-passenger buses for the trolley car service formerly rendered by the Vermont company, and the Mississippi Power & Light Company, Greenville division, replaced 8.5 miles of trolley service with bus service. In Canada, the Brantford & Hamilton Electric Railway used buses for the first time this year.

Two important and interesting changes in bus operations were effected in 1929. First was the purchase of the companies previously controlled by the O. G. Schultz Management operating in southern New Jersey by Public Service Co-ordinated Transport, Newark, N. J. Twenty-one companies operating eighteen lines were involved in the sale.

The second large step in the unification of all surface transportation of a community was effected in St. Louis with the purchase of the People's Motor Bus Company by the City Utilities Company and the subsequent agreement for co-ordinated operation between this latter company and the St. Louis Public Service Company, now operating all trolley service. Although the People's Motor Bus Company will for the present be operated independently, it will be in friendly co-operation with the electric railway system and the Public Service Company will have the right to purchase the bus company when financial and franchise situations in St. Louis shall warrant.

The City Utilities Company recently acquired 38 per cent of the common stock of the St. Louis Public Service Company and now the purchase of the People's Motor Bus Company gives it a monopoly on the major transportation facilities of the city.

Further co-ordination of car and bus operations, with a number of minor substitutions of buses for cars, is practically assured for the near future. Many properties are continuing to operate some unprofitable lines which will soon require new track, overhead or paving and the question of substitution of bus service on these routes will have to be considered. In some cases it will be found to be economically sound to rebuild the present structure, while again, in many instances, buses will

Buses Bought by Railways During 1929

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Alabama					
Alabama Power Co. (Gadsden Div.)	4	4	White	Bender	29
Arizona					
Phoenix Street Railway	2	†2	Studebaker	Studebaker	21
Tucson Rapid Transit Co.	1	1	Dodge	Dodge	21
California					
Los Angeles Motor Bus Co.	2	2	Twin Coach	Twin Coach	40
Los Angeles Railway	22	8	Twin Coach	Twin Coach	40
		6	White	White	..
		8			
Municipal Railway of San Francisco	1	1	Mack	Mack	..
Pacific Electric Railway	14	*3	Moreland	Moreland	25
		*1	White	Motor Transit	25
		10	Twin Coach	Twin Coach	40
Pacific Gas & Electric Co.	4	4	Yellow Coach	Yellow Coach	21
San Diego Electric Ry.	9	6	Twin Coach	Twin Coach	39
		3	Fageol	Fageol	..
Colorado					
Denver Tramway	13	3	White	Bender	25
		3	Mack	Mack	..
		2	A.C.F.	A.C.F.	..
		*1	Dodge	Local	24
		*3	Dodge	Dodge	21
		*1	Reo	Fitzjohn	21
		*1	Studebaker	Studebaker	18
Connecticut					
Connecticut Co.	23	21	Mack	Mack	29
		2	Yellow Coach	Yellow Coach	29
Danbury Power and Transportation Co.	1	1	Yellow Coach	Yellow Coach	21
Groton-Stonington Traction Co.	1	1	Twin Coach	Twin Coach	40
New Haven & Shore Line Ry.	16	5	Twin Coach	Twin Coach	37
		11	Twin Coach	Twin Coach	21
Delaware					
Delaware Electric Power Co.	5	5	Yellow Coach	Yellow Coach	29
District of Columbia					
Capital Traction Co.	13	4	Yellow Coach	Yellow Coach	29
		3	Yellow Coach	Yellow Coach	29
		1	A.C.F.	A.C.F.	29
		*5	Fageol	Fageol	27
Washington Railway & Electric Co.	18	12	Yellow Coach	Yellow Coach	21
		6	Yellow Coach	Yellow Coach	29
Florida					
Jacksonville Traction Co.	4	4	Twin Coach	Twin Coach	40
Georgia					
Georgia Power Co.	13	4	Reo	Fitzjohn	23
		3	White	White	23
		6	Yellow Coach	Yellow Coach	23
Savannah Electric & Power Co.	12	7	Twin Coach	Twin Coach	40
		2	Yellow Coach	Yellow Coach	21
		3	Mack	Mack	29
Idaho					
Boise Street Car Co.	4	4	White	Bender	25
Illinois					
Chicago & Illinois Valley R.R.	5	3	Yellow Coach	Yellow Coach	21
		*2	Dodge	Dodge	21
Chicago North Shore & Milwaukee R.R.	18	10	Yellow Coach	Lang	22
		6	A.C.F.	A.C.F.	30
		2	A.C.F.	A.C.F.	39
Chicago & West Towns Ry.	5	5	Mack	Cummings	29
Evanston Railway	10	†5	Yellow Coach	Yellow Coach	39
		*2	Yellow Coach	Yellow Coach	21
		*3	Yellow Coach	Yellow Coach	29
Illinois Power & Light Corp. Champaign	2	2	Yellow Coach	Yellow Coach	29
Illinois Power & Light Corp. Decatur	3	3	Yellow Coach	Yellow Coach	29
Illinois Power & Light Corp. Galesburg	7	7	Yellow Coach	Yellow Coach	21
Illinois Power & Light Corp. Jacksonville	1	*1	Dodge	Dodge	21
Illinois Power & Light Corp. Quincy	6	6	Yellow Coach	Yellow Coach	21
Illinois Power & Light Corp. Springfield	3	3	Mack	Mack	25
Joliet, Plainfield and Aurora Trans. Co.	2	1	Will	Eckland	30
		*1	Yellow Coach	Yellow Coach	21
Rockford Electric Co.	2	2	A.F.C.	A.C.F.	40
Indiana					
Beech Grove Traction Corp.	5	5	Reo	Fitzjohn	21
Indianapolis, Columbus & Southern Traction Co.	2	2	Dodge	Dodge	21
Indianapolis Street Railway	18	3	Dodge	Dodge	21
		8	White	White	29
		5	Mack	Mack	29
		2	Mack	Mack	21
Interstate Public Service	2	2	Dodge	Dodge	21
Northern Indiana Power Co.	2	2	International	Burket	15
Southern Indiana Gas & Electric Co.	7	3	Dodge	Dodge	21
		4	Yellow Coach	Yellow Coach	29
Terre Haute, Indianapolis & Eastern Traction Co.	14	*8	White	White	28
		*4	Mack	Mack	28
		*1	Ruggles	Ruggles	22
		*1	Ruggles	Ruggles	25

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Iowa					
Cedar Rapids & Iowa City Ry.	8		Yellow Coach	Yellow Coach	21
	*3		Mack	Mack	25
Clinton, Davenport & Muscatine Ry.	2	2	Yellow Coach	Yellow Coach	21
Fort Dodge, DesMoines & Southern R.R.	8	3	Yellow Coach	Yellow Coach	21
		5	Reo	Fitzjohn	20
Interstate Power Co.	2	2	Mack	Mack	25
Iowa Southern Utilities Co.	9	9	Mack	Mack	25
Mississippi Valley Elec. Co.	1	1	Yellow Coach	Yellow Coach	21
Tri-City Railway of Iowa	5	3	Yellow Coach	Yellow Coach	29
		2	Mack	Mack	29
Kentucky					
Kentucky Traction & Terminal Co.	8	6	Yellow Coach	Yellow Coach	29
		2	A.C.F.	A.C.F.	29
Kentucky Utilities Co.	4	4	Yellow Coach	Yellow Coach	21
Louisville Railway	3	3	Yellow Coach	Yellow Coach	29
Louisiana					
Louisiana Electric Co.	3	3	Dodge	Dodge	17
New Orleans Public Service, Inc.	7	7	Yellow Coach	St. Louis Car Co.	34
Maine					
York Utilities Co.	1	1	Studebaker	Studebaker	15
Maryland					
Cumberland & Westernport Transit Co.	4	3	White	Bender	29
		1	Yellow Coach	Yellow Coach	29
Potomac Edison Co.	22	2	International	Lang	27
		6	Yellow Coach	Yellow Coach	21
		5	White	Bender	25
		3	Studebaker	Studebaker	21
		2	White	White	20
		2	White	White	25
		1	White	White	17
		1	Studebaker	Studebaker	20
United Railways & Electric Co.	12	5	A.C.F.	A.C.F.	30
		7	White	Bender	19
Massachusetts					
Berkshire Street Railway	4	4	Yellow Coach	Yellow Coach	21
Boston Elevated Railway	26	1	White	Farnum Nelson.	33
		1	White	Farnum Nelson.	39
		5	A.C.F.	A.C.F.	40
		†5	A.C.F.	A.C.F.	36
		5	Twin Coach	Twin Coach	37
		9	Twin Coach	Twin Coach	39
Boston, Worcester & New York Street Ry.	4	3	Mack	Mack	29
		1	A.C.F.	A.C.F.	29
Eastern Massachusetts St. Ry.	19	11	Studebaker	Superior	21
		8	A.C.F.	A.C.F.	40
East Taunton Street Ry.	1	1	Dodge	Dodge	21
Fitchburg & Leominster St. Railway	3	3	Studebaker	Studebaker	23
Gardner Templeton St. Ry.	2	1	White	Bender	29
		1	Larrabee	Boston	20
Interstate Street Ry.	7	2	Twin Coach	Twin Coach	29
		3	A.C.F.	A.C.F.	29
		2	White	White	23
Middlesex & Boston St. Ry.	16	16	White	Bender	29
Plymouth & Brockton St. Ry.	3	3	Mack	Wayne	40
Springfield Street Ry.	5	3	Mack	Farnham Nelson	29
		2	Yellow Coach	Yellow Coach	25
Union Street Railway	4	2	Yellow Coach	Yellow Coach	29
		2	Yellow Coach	Yellow Coach	21
Worcester Consol. St. Ry.	3	1	Yellow Coach	Yellow Coach	25
		1	White	Brown	29
		1	White	Bender	25
Michigan					
Detroit Street Railway	27	25	Yellow Coach	Yellow Coach	29
		1	Dodge	Dodge	21
		†1	Twin Coach	Twin Coach	..
Eastern Michigan Railways	41	6	Yellow Coach	Yellow Coach	21
		8	A.C.F.	A.C.F.	29
		5	Fageol	Fageol	29
		2	Studebaker	Studebaker	21
		10	Yellow Coach	Yellow Coach	17
		10	Yellow Coach	Yellow Coach	33
Grand Rapids R.R.	2	2	Yellow Coach	Yellow Coach	21
Saginaw Transit Co.	5	5	Yellow Coach	Yellow Coach	23
Minnesota					
Duluth Street Railway	2	2	Yellow Coach	Yellow Coach	21
Twin City Rapid Transit Co.	18	2	Will	Eckland	23
		2	Will	Eckland	29
		4	White	Eckland	29
		4	Mack	Eckland	29
		3	Mack	Lang	29
		†3	Yellow Coach	Eckland	32
Mississippi					
Mississippi Power & Light Co. (Greenville)	4	3	Dodge	Dodge	21
		1	White	Bender	15
Missouri					
City Light & Traction Co.	3	3	Yellow Coach	Yellow Coach	23
Springfield Traction Co.	3	3	Yellow Coach	Yellow Coach	23
St. Joseph Railway, Light, Heat & Power Co.	14	4	Yellow Coach	Bender	21
		4	White	Bender	21
		6	Mack	Mack	29
Nebraska					
Omaha & Council Bluffs Street Ry.	24	8	Yellow Coach	Yellow Coach	21
		8	White	Bender	29
		8	Douglas	Bender	29
New Jersey					
Atlantic City & Shore R.R.	9	9	Yellow Coach	Yellow Coach	29
Coast Cities Railway	8	4	Yellow Coach	Lang	37
		4	Yellow Coach	Yellow Coach	23

Buses Bought by Railways During 1929—(Continued)

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Five Mile Beach Elec. Ry...	2	2	Dodge	Dodge	21
New Jersey Interurban Co..	3	2	Hahn	Hahn	29
		1	Studebaker	Studebaker	21
Public Service Coordinated Transport.....	638	34	Yellow Coach	Yellow Coach	29
		94	Yellow Coach	Public Service	29
		50	Yellow Coach	Yellow Coach	39
		†161	Yellow Coach	Public Service	29
		†1	Yellow Coach	Lang	29
		†10	Yellow Coach	Lang	38
		24	Dodge	Dodge	21
		*264	Miscellaneous		..
Trenton Transit Co.....	4	4	Twin Coach	Twin Coach	40
New York					
Brooklyn & Queens Transit Corp.....	24	12	A.C.F.	A.C.F.	40
		10	Twin Coach	Twin Coach	40
		2	Yellow Coach	Yellow Coach	38
Buffalo & Erie Railway.....	2	2	Mack	Fremont	21
Fonda, Johnstown & Gloversville R.R.....	5	1	Mack	Mack	20
		4	Mack	Mack	25
Hamburg Railway.....	11	7	Mack	Birney	29
		2	Mack	Whitfield	33
		2	Mack	Mack	33
Jamestown Street Ry.....	5	2			21
		2			29
		1			26
New York State Railways, Rochester.....	37	18	Mack	Bender	33
		5	White	Bender	33
		10	White	Bender	38
		4	Mack	Bender	29
New York State Railways, Syracuse.....	13	9	Mack	Bender	30
		1	Mack	Bender	36
		3	Yellow Coach	Bender	30
Syracuse & Eastern R.R...	1	1	Reo	Fitzjohn	29
Third Avenue Railway.....	31	12	Versare	Versare	37
		10	White	White	41
		*9	Six Wheel	Six-Wheel	29
Triple Cities Traction Co...	3	*2	White	Bender	29
		*1	Brockway	Brockway	15
United Traction Co.....	10	10	Twin Coach	Twin Coach	40
Waverly, Sayre & Athens Trac. Co.....	5	5	Yellow Coach	Yellow Coach	21
North Carolina					
Carolina Power & Light Co., Raleigh Div.....	1	1	Corbitt	Hackney	21
Durham Public Service Co.	2	2	White	White	..
North Carolina Pub. Service	1	1	Yellow Coach	Yellow Coach	21
Ohio					
Cincinnati Street Railway...	22	4	Mack	Mack	25
		10	Mack	Mack	29
		8	Twin Coach	Twin Coach	40
City of Ashtabula (Div. of Street Rys.).....	1	1	Dodge	Dodge	21
Cleveland Railway.....	25	5	Yellow Coach	Lang	38
		20	White	Lang	38
Cleveland, Southwestern Railway & Light Co.....	15	9	White	Bender	29
		1	Yellow Coach	Yellow Coach	24
		1	Schacht	Schacht	24
		3	Studebaker	Miller	12
		1	Pierce Arrow	Pierce Arrow	29
Community Traction Co...	4	4	Mack	Mack	29
Lorain Street Railway.....	3	3	Yellow Coach	Yellow Coach	21
Northern Ohio Power & Light Co.....	46	5	White	Lang	29
		41	Twin Coach	Twin Coach	40
Ohio Public Service Co.....	2	2	Yellow Coach	Yellow Coach	21
Penn - Ohio Public Service Corp.....	6	6	White	Bender	35
Pioneer Transportation Inc.	2	2	A.C.F.	A.C.F.	..
Portsmouth Pub. Serv. Co..	3	3	White	White	..
Youngstown Municipal Ry.	10	10	Twin Coach	Twin Coach	42
Oklahoma					
Oklahoma Railway.....	18	2	Sudebaker	Superior	21
		4	Dodge	Dodge	21
		6	Yellow Coach	Yellow Coach	23
		2	Yellow Coach	Yellow Coach	17
		3	Yellow Coach	Yellow Coach	21
		1	Dodge	Dodge	17
Oklahoma Union Railway..	2	2	Mack	Mack	29
Oregon					
Commission of Public Docks	1	1	Federal	Wayne	16
Portland Electric Power Co.	6	5	A.C.F.	A.C.F.	40
		1	Twin Coach	Twin Coach	40
Pennsylvania					
Allentown & Reading Traction Co.....	3	3	Mack	Mack	29
Altoona & Logan Valley Electric Railway.....	5	5	A.C.F.	A.C.F.	24
Beaver Valley Traction Co.	2	2	Yellow Coach	Yellow Coach	21
Citizens Transit Co.....	9	8	A.C.F.	A.C.F.	33
		†1	A.C.F.	A.C.F.	33
East Penn Traction Co.....	1	1	White	Bender	21
Erie Railways.....	5	5	Yellow Coach	Yellow Coach	23
Johnstown Traction Co.....	7	7	Yellow Coach	Yellow Coach	21
Lehigh Traction Co.....	3	3	Mack	Mack	29
North Branch Bus Co.....	1	1	Reo	Fitzjohn.....	21
Philadelphia & Westchester Traction Co.....	7	6	Twin Coach	Twin Coach	40
		1	White	Bender	29
Pittsburgh Railways.....	37	9	Yellow Coach	Yellow Coach	92
		5	Yellow Coach	Yellow Coach	21
		6	Yellow Coach	Lang	21
		12	White	Bender	21
		5	White	Fremont	21
Pocono Motor Coach Co...	2	2	Yellow Coach	Yellow Coach	21
Scranton Railway.....	5	2	A.C.F.	A.C.F.	23
		3	A.C.F.	A.C.F.	33
Southern Pennsylvania Traction Co.....	6	6	Yellow Coach	Yellow Coach	29
West Penn Railways.....	4	4	Dodge	Dodge	21
Westside Motor Transit Co.	1	1	Yellow Coach	Yellow Coach	17
Woodlawn & Southern Street Ry.....	6	6	Mack	Mack	29
Rhode Island					
Newport & Providence Ry..	4	4	White	White	..
United Electric Railways...	72	4	Yellow Coach	Yellow Coach	29
		37	Twin Coach	Twin Coach	37
		31	White	Bender	33
South Dakota					
Sioux Falls Traction System	10	4	Reo	Fitzjohn	21
		4	Yellow Coach	Yellow Coach	21
		2	White	Bender	15
Tennessee					
Knoxville Power & Light Co.	6	6	Yellow Coach	Yellow Coach	23
Tennessee Electric Power Co.	5	1	Twin Coach	Twin Coach	40
		2	Studebaker	Studebaker	22
		2	Studebaker	Studebaker	14
Tennessee Transp. Co.....	5	5	Studebaker	Studebaker	22
Texas					
Abilene Traction Co.....	2	2	Reo	Fitzjohn	..
Austin Street Railway.....	4	4	Dodge	Dodge	21
Dallas Ry. & Terminal Co..	16	14	Dodge	Dodge	21
		2	Dodge	Dodge	14
Eastern Texas Electric Co...	6	*4	Yellow Coach	Yellow Coach	21
		2	White	Bender	41
El Paso Electric Co.....	1	1	White	White	25
Houston Electric Co.....	9	1	Twin Coach	Twin Coach	40
		1	Mack	Mack	33
		3	White	Bender	16
		2	White	Bender	21
		1	Twin Coach	Twin Coach	21
		1	Ford	Aero Car	16
Neuces Railway.....	1	..			..
Northern Texas Traction Co.	17	10	Twin Coach	Twin Coach	40
		6	Reo	Reo	21
		*1	Studebaker	Studebaker	16
San Antonio Pub. Serv. Co..	14	14	Reo	Fitzjohn	22
Utah					
Utah Light & Traction Co...	9	1	Studebaker	Stevens	13
		†7	Twin Coach	Twin Coach	..
		1	Twin Coach	Twin Coach	..
Utah Rapid Transit Co.....	2	2	Pierce Arrow	Buffalo	25
Vermont					
Burlington Rapid Transit Co.....	18	9	Dodge	Dodge	21
		6	Twin Coach	Twin Coach	40
		3	White	Bender	39
Twin State Gas & Elec. Co...	1	1	Yellow Coach	Yellow Coach	21
Virginia					
Lynchburg Traction & Light Co.....	2	2	Dodge	Dodge	21
Petersburg, Hopewell & City Point Railway.....	1	1	Dodge	Dodge	21
Roanoke Railway & Electric Co.....	8	4	Dodge	Dodge	21
		4	Yellow Coach	Yellow Coach	21
Virginia Elec. & Power Co...	30	30	Twin Coach	Twin Coch	40
Washington					
Pacific Northwest Traction Co.....	4	2	A.C.F.	Newell	34
		2	A.C.F.	Newell	38
Seattle & Rainier Valley Ry.	1	1	Studebaker	Heiser	21
Tacoma Railway & Pwr. Co.	7	2	Mack	Mack	29
		4	Mack	Mack	37
		1	Mack	Mack	33
West Virginia					
Monongahela West Penn Public Service Co.....	12	2	A.C.F.	A.C.F.	29
		4	Dodge	Dodge	21
		*6	Fageol	Fageol	26
Wheeling Traction Co.....	47	3	White	Bender	29
		2	Dodge	Dodge	21
		*42	Misc.	Misc.	..
Wisconsin					
Milwaukee Electric Ry. & Light Co.....	20	7	Twin Coach	Twin Coach	35
		7	Twin Coach	Twin Coach	18
		1	Wills	Eckland	35
		5	Yellow Coach	Yellow Coach	17
Mississippi Valley Pub. Serv.	2	2	Yellow Coach	Yellow Coach	23
Wisconsin Gas & Elec. Co...	1	1	Yellow Coach	Yellow Coach	29
Wisconsin Pwr. & Lt. Co....	15	8	Yellow Coach	Yellow Coach	22
		7	Yellow Coach	Yellow Coach	24
Wyoming					
Cheyenne Motor Bus Co....	1	1	Reo	Fitzjohn	21
U. S. Possessions					
Honolulu Rapid Transit Co.	3	3	White	White	21
Manila Electric Co.....	46	..	Ford	Manila Elec.	17
		..	Chevrolet	Manila Elec.	17
		..	Dodge	Manila Elec.	17

Buses Bought by Railways in 1929—(Concluded)

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Canada					
Brantford & Hamilton Electric Railway	5	5	White	Bender	29
Brantford Municipal Ry	1	1	Yellow Coach	Yellow Coach	21
Dominion Power & Transmission Co	5	5	White	Bender	29
London Street Ry	5	5	Yellow Coach	Yellow Coach	23
Niagara, St. Catherines & Toronto Ry	3	2	Yellow Coach	Fisher	21
		1	Leyland	Smith	29
Ottawa Electric Ry	2	2	Yellow Coach	Yellow Coach	28
Sherbrooke Ry. & Power Co.	2	2	Yellow Coach	Yellow Coach	21
Toronto Transportation Commission	48	5	Yellow Coach	Yellow Coach	17
		20	Yellow Coach	Yellow Coach	21
		10	Yellow Coach	Lang	33
		*13	Misc.	Misc.	30
Winnipeg Electric Co	2	1	Reo	Freemont	25
		1	Mack	Mack	33

solve the financial and service problems by extending the present lines into new territory or rerouting them through more thickly populated districts. Utilization of the bus as a feeder to existing rail arteries is now recognized as sound practice and many railway companies have come out of the red figures into the black by careful readjustment of bus and trolley services.

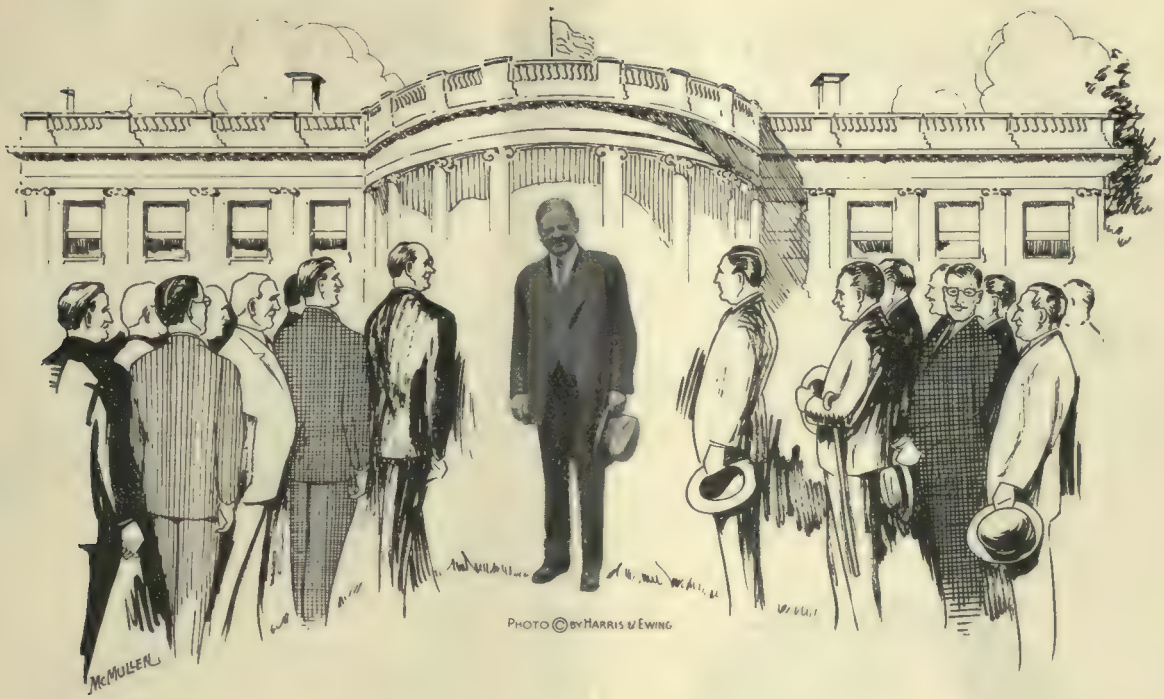
As to the type of buses purchased this year, approximately 65 per cent were of a capacity seating 29 to 40 passengers, 25 per cent had a seating capacity of from 21 to 28 passengers, and 10 per cent were of less than the 21-passenger type. Of the more than 1,800 new buses purchased, approximately 200 were of the gas-electric type. Although a large number of the buses purchased were for use on new de luxe routes, such as interurban and interstate service, many companies are now purchasing a finer type of equipment for selected city service lines. This kind of bus appeals to a new class of rider, the automobile owner, and on week ends and holidays allows a surplus of de luxe equipment for special and chartered work.

Bus Route Extensions, City and Intercity

	Miles
Alabama	
Alabama Power (Gadsden Div.)	1.15
Arizona	
Phoenix Street Railway	7.75
Tucson Rapid Transit Co	1.96
California	
Los Angeles Motor Bus Co	2.73
Los Angeles Railway	7.56
Municipal Railway of San Francisco	1.23
Pacific Electric Railway	33.20
Pacific Gas & Electric Co	1.58
Peninsular Railway	2.20
San Diego Electric Ry	2.40
Colorado	
Denver Tramway Corp	11.20
Connecticut	
Connecticut Co	46.49
Lordship Railway	3.00
Delaware	
Delaware Electric Power Co	12.49
District of Columbia	
Washington Railway & Electric Co	17.15
Florida	
Jacksonville Traction Co	22.30
Tampa Electric Co	1.10
Georgia	
Georgia Power Co	5.10
Savannah Electric and Power Co	5.80
Illinois	
Alton Railway	3.00
Chicago, North Shore & Milwaukee R.R	71.00
East St. Louis Railway	2.70
Evanston Railway	19.00
Illinois Power Co	1.06
Illinois Pwr. & Lt. Corp. (Galesburg Div.)	3.50
Illinois Power & Lt. Corp. (Quincy Div.)	3.89
Joliet, Plainfield and Aurora Trans. Co	44.00
Indiana	
Beech Grove Traction Corp	17.00
Chicago, South Shore & South Bend R.R	3.30
Indiana Service Corp	1.50
Indianapolis Street Railway	13.28
Interstate Public Service	2.50
Southern Indiana Gas & Electric Co	1.70
Terre Haute, Indianaplis & Eastern Trac. Co.	52.00
Iowa	
Clinton, Davenport and Muscatine Ry	30.00
Mississippi Valley Electric Co	1.50
Tri-City Railway of Iowa	2.75
Kansas	
Kansas City, Leavenworth & Western Ry	0.65
Kansas Power & Light Co	2.00
Wichita Falls Traction Co	1.10
Kentucky	
Kentucky Traction & Terminal Co	6.00
Kentucky Utilities Company	2.20
Louisville Ry	0.31
Louisiana	
New Orleans Public Service	5.97

	Miles
Maryland	
Potomac Edison Co	150.30
United Railways & Electric Co	15.40
Massachusetts	
Berkshire Street Ry	20.00
Boston Elevated Railway Co	84.03
Eastern Massachusetts Street Ry	30.95
Fitchburg and Leominster Street Ry	5.00
Gardner Templeton Street Ry	29.00
Middlesex and Boston Street Ry	15.59
Union Street Railway	2.00
Worcester Consolidated Street Ry	17.00
Michigan	
Eastern Michigan Railways	87.20
Minnesota	
Northern States Power Co	1.20
Twin City Rapid Transit Co	1.75
Mississippi	
Mississippi Pwr. & Lt. Co. (Greenville)	8.50
Missouri	
City Light and Traction Co	7.20
Kansas City Public Service Co	12.18
St. Joseph Railway, Lt., Heat, & Pwr. Co	6.30
St. Louis Public Service Co	3.00
Nebraska	
Omaha & Council Bluffs Street Ry	6.80
New Jersey	
Coast Cities Railway	8.70
Five Mile Beach Electric Ry	2.20
Public Service Coordinated Transport	1,108.00
New York	
Buffalo and Erie Railway	18.90
Fonda, Johnstown and Gloversville R.R	5.56
Hamburg Railway	33.00
International Railway	3.00
Jamestown Street Ry	6.40
New York & Stamford Railway	12.70
New York State Railways (Rochester Div)	26.80
New York State Railways (Syracuse Div.)	6.40
Syracuse & Eastern R.R	0.30
Third Avenue Railway	6.35
Triple Cities Traction Company	1.90
United Traction Co	5.69
Ohio	
Cincinnati Street Railway	3.20
Cleveland Railway	17.13
Cleveland Southwestern Ry. & Light Co	16.00
Columbus Railway, Power & Light Co	0.80
Community Traction Co	14.90
Northern Ohio Power & Light Co	149.26
Ohio Public Service Company	5.00
Penn-Ohio Public Service Corp	20.45
Pioneer Transportation, Inc	7.10
West End Traction Co	0.03
Youngstown Municipal Railway	5.70
Oklahoma	
Oklahoma Railway	87.18
Oregon	
Commission of Public Docks	1.50
Portland Electric Power Co	3.00

	Miles
Pennsylvania	
Beaver Valley Traction Co	0.20
Citizens Transit Company	1.40
East Penn Traction Co	8.00
Erie Railways	3.80
Philadelphia & West Chester Traction Co	1.00
Pittsburgh, Harmony, Butler & N. Castle Ry.	15.00
Pittsburgh Railways	63.25
Pocono Motor Coach Co	30.00
Scranton Railway	14.55
West Penn Railways	11.50
Rhode Island	
United Electric Railways	46.37
South Dakota	
Sioux Falls Traction System	10.28
Tennessee	
Knoxville Power & Light Co	6.15
Tennessee Electric Power Co	23.72
Tennessee Transportation Co	12.61
Texas	
Dallas Ry. & Terminal Co	9.00
Eastern Texas Electric Co	10.00
Houston Electric Co	8.39
Northern Texas Traction Co	16.85
San Antonio Public Service Co	5.08
Utah	
Utah Light & Traction Co	1.14
Vermont	
Burlington Rapid Transit Co	24.70
Virginia	
Lynchburg Traction & Light Co	0.10
Virginia Electric & Power Co	7.27
Washington	
Pacific Northwest Traction Co	28.00
Seattle Municipal Street Ry	5.10
West Virginia	
Monongahela West Penn Public Service Co.	147.77
Wheeling Traction Co	197.60
Wisconsin	
Milwaukee Electric Ry. & Light Co	35.57
Wisconsin Power & Light Co	168.00
Wisconsin Public Service	2.40
Wyoming	
Cheyenne Motor Bus Co	6.50
U. S. Possessions	
Manila Electric Co	38.07
Honolulu Rapid Transit Co	6.80
Canada	
Dominion Power & Transmission Co	11.00
Brantford & Hamilton Electric Ry	24.00
British Columbia Electric Ry	18.00
Hamilton Street Ry	1.50
Hydro-Electric Railways (Kingsville)	4.00
Hydro-Electric Railways (Windsor)	5.00
London Street Ry	3.30
Montreal Tramways	0.25
Ottawa Electric Railway	5.50
Sherbrooke Railway & Power Co	50.00
Toronto Transportation Commission	147.04
T. T. C. Radial Lines	30.20
Winnipeg Electric Co	0.92



It's *Sand* That Keeps the Wheels from Slipping

By

G. J. MacMURRAY

News Editor *Electric Railway Journal*

Atlantic City on New Jersey's shore!
Its boardwalk free, but nothing more!
To which sweet spot each year or so
A. E. R. A. decides to go
To hold a bus and street car show,
Converse and hear dear Old Bill Wise
Socratic facts clothed in disguise—
How good 'tis now this all to ponder
And then to sit at ease and wonder
When transportation's apogee will come
As a result of all that's said and done.
So once again with pen in hand
We scan the facts from all the land
To glean good cheer for all the crew
Rightly to start the year anew,
With shining thoughts for June's debate
Under Paul Shoup at the Golden Gate.

SOME TIME ago a wit remarked that in these United States too many persons were riding around in Lincolns who ought to be using Fords and that too many others were using Fords who ought to be pushing wheelbarrows. This, of course, was exaggeration for the sake of emphasis, but back of it was the scintilla of common sense so often spoken in jest. Anyway, a lot of us have learned that we have to do more than give ourselves a close shave each morning in order to be prepared for the day's grind. This ought to be encouraging to local transportation managers and disheartening to taxicab drivers. There ought to be some cheer in the fact that 1929 the local transportation industry did a gross business in excess of $1,000,000,000, but then some pessimist will arise to ask what the net was, not realizing that to a considerable degree the net depends on the individual. The pessimists are like the black little boy who stood straight and stiff and still beside the front of the house whose dead master was about to be buried. When the minister arrived, a lady whispered to this straight, still, little boy:

"Dere's de preacher. Service gwine to start now. Ain't you gwine in?"

"Ah can't, mum," mumbled the boy. "Ah's de crêpe."

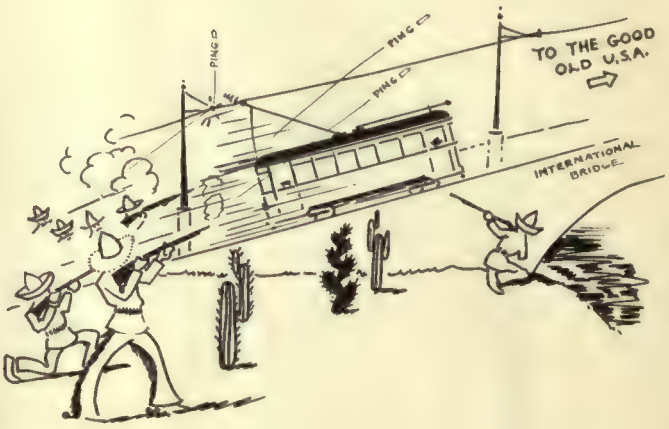
These fellows are the crêpe.

Crêpe and crêpehangers are all right in their place, but they haven't any place in the local transportation industry. The need is for more men conscious of their powers—more men like the Irishman at the dinner where every guest had to make a speech, sing a song or tell a story. Well, when this Irishman's time came, he said:

Side Lights on News Events of 1929



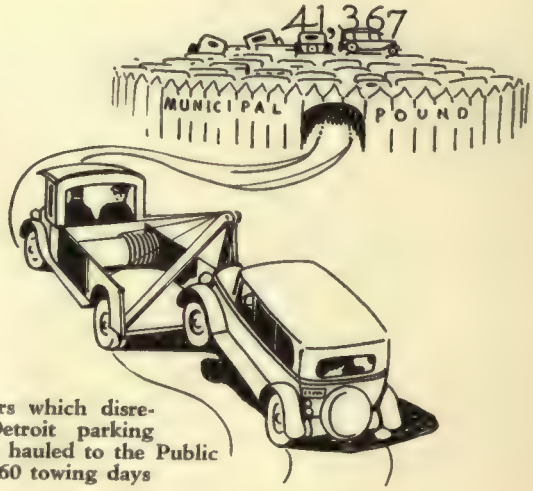
Taxi rate wars didn't help the taxis much. Springfield, Mass., and Philadelphia were among the cities to see the folly of unrestrained taxi operation.



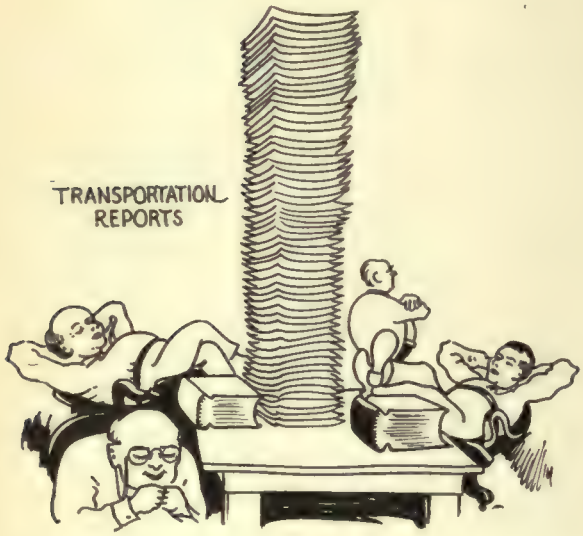
When Mexicans across the border from El Paso got careless with firearms, the cars run over the international bridge scooted for the U. S. A.



Historical and commercial subjects were included in a film of Virginia's development made by the utility at Richmond as a contribution to the state's progress.



41,367 cars which disregarded Detroit parking rules were hauled to the Public Pound in 60 towing days



City officials at Chicago sleep while reports on the transportation situation accumulate. The pile is now 6 ft. high, weighs 200 lb. and cost $1,500,000.



Los Angeles has a lot of Sunny Jims, people who realize that the increased fare allowed there is going to react to their benefit.

"Friends, I can't make a speech, or sing a song, or tell a story, but I'll fight any man in the room."

That man was conscious of his powers. Local transportation men, who do know transportation, need more of this Irishman's will to do. After all, a grapefruit is only a lemon that has been given a chance and taken advantage of it.

Statistical facts appear to indicate that the industry is very much like Hiram, Mary's beau. "Mary," began Hiram, "you know I got a clearin' over thar an' a team and wagon and some hawgs an' cows an' I calc'late on buildin' a house this fall an'—"

Just then he was interrupted by Mary's mother in the kitchen.

"Mary," she called in a loud voice, "is that young man thar yit?"

Back came the answer, "No, mar, but he's gittin' thar."

And the local transportation service is getting there. Let's look at the facts. Rail service is being modernized, buses are being co-ordinated with cars, city-wide taxicab fleets taken over, and in a few instances, airplanes used in supplemental service. The private motor remains the most serious competitor of the co-ordinated services. Buses no longer are considered as serious competitors. Most of the important urban bus lines have been absorbed by rail line managements, about 12,500 buses being operated by the electric railways in conjunction with 80,000 passenger rail cars. Most of the independent bus operators are now found running interstate service. That's how things have changed. The American drug store isn't what it used to be, and neither is the local transportation business. It would not do for a drum major to have an inferiority complex.



Charles Gordon was installed in the office of managing director

Fares are at the peak for all time, averaging approximately 8⅔ cents for the entire country. The greatest single unit of cash fare is 10 cents. Less than a score of cities have a nickel fare, and most of them are small. Where 5-cent fares obtain, special reasons are responsible. In New York, Subway deficits are paid from taxes. In New Jersey a zone ride system obtains. On the municipal system in San Francisco taxes are refunded. There are a few small cities in which the interurbans charge 5 cents within the city limits as a part of a higher fare for service outside of the town.

Wages have held an even keel, there being a change of less than ½ cent an hour during the last year. Little change in taxes is noted. Net revenue for the first six months of 1929 has been 1.75 per cent higher for the entire country than it was during 1928. This is due to increased fares. Traffic for the same corresponding period is off ¾ of 1 per cent for the entire co-ordinated systems. The total of passengers carried last year was 16,000,000,000, divided 15,000,000,000 rail cars and 1,000,000,000 buses. Expenses are 1.9 per cent lower. The number of car-miles run is off only ½ of 1 per cent.

In this business, if you're going to survive, you've just got to be undaunted and adaptable, like the piano tuner a traveler met in the West some time ago. It was the fellow traveler and not the piano tuner who was unimaginative.

"Surely," said the commiserative one, "I shouldn't imagine that pianos were very plentiful in this region."

"No, they are not," said the piano tuner, "but I make a pretty fair income tightening up barbed wire fences."

As Ed Wickwire said in Atlantic City, "Remember that Noah floated the ark when the rest of the world was in liquidation." There are some things we don't have to prove. You admit them, as the student did who was asked if he could prove that the square of the hypotenuse is equal to the sum of the squares of the legs of the triangle. Didn't Jack Shannahan on behalf of the association tell Mr. Hoover at the conference in Washington that statistics indicated that this industry was spending more than $1,000,000 a day during 1929 and probably would equal or even exceed this amount during the year 1930?

With all due respect to Mr. Wickwire, the bon mot of the Atlantic City convention was the remark by President Barnes that it was the task of the industry today to provide the bones of transportation facilities and clothe them with the flesh of service. That may not be a perfect figure of speech, but it states the idea succinctly. Incidentally, Jim Barnes showed Louisville how he proposed to carry out the idea when he exhibited his four experimental cars. Second perhaps to Mr. Barnes in the forcefulness of his remarks came Thomas N. McCarter, who said that there had been a change in the character of the service which people want, but there had been no abatement in the total demand for local transportation. Certainly he has lived up to the idea of co-ordination, one of the latest moves of his company being to take over a large bus system in southern New Jersey.

It took a whole issue of the JOURNAL and four little daily journals to tell the story of the A. C. convention. We can't afford to get started on that subject, other than to say that we hope to greet Paul Shoup, the new president, out in San Francisco next June.

So much for that. The number of interesting facts about this industry is legion. At least the JOURNAL's index makes it appear so. But nobody is ever satisfied with this review—no more satisfied than was the owner of the hen who had by mistake been fed sawdust instead of oatmeal. This hen laid twelve eggs, sat on them and when they hatched, eleven of the chickens had wooden legs and the twelfth was a woodpecker. What, for instance, can I consistently make out of the fact that the Baltimore fare case is still pending, that Los Angeles got its fare increase, that Cleveland intends to advance



Jim Barnes shows Louisville some samples

its fares, that Louisville got a fare boost, that out in Oregon the Portland Electric Power Company needs a fare advance, and that in Cincinnati the demands of outlying sections for increases in service, if granted, would jeopardize the present fares under service at cost. On cars and fares it leads me to wonder:

What is a street car? Who can say?
Its face uplifted in recent years
Fills old timer's eyes with tears
O'er the shattered ideal of the one-horse shay.

What is a street car? A faithful chariot
Entrusted to a hopeful manager's care
To be run by him from here to there
At a fare that is adequate.

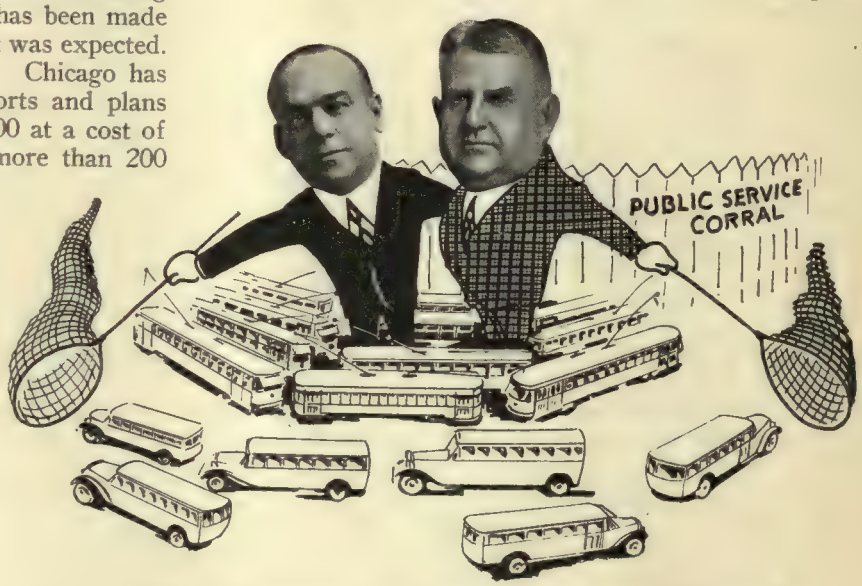
And what is the fare? Not even the prophets know.
Answer they can not, for it all depends
On what the management can achieve,
Whether the earnings may be made to show
Something left over for dividends.
That stockholders may not be left to grieve.

One of the most interesting things on fares contained in the year's news was the summary of the California Railroad Commission's report on results in that state rendered to the Commission for the District of Columbia where not only the question of fares but the matter of the consolidation of the two local railways is being agitated. In Illinois the Governor signed the bill looking toward unification in Chicago. Progress has been made in the windy city, but not to the extent that was expected. Samuel Insull lays the blame on politics. Chicago has sufficient facts to guide it. Subway reports and plans for a unified system there, made since 1900 at a cost of $1,500,000, stand 6 ft. high and weigh more than 200 lb. But Cleveland has gone right ahead. The Cleveland Railway, under Joe Alexander and the Van Sweringens, has actually developed a program of co-ordination which contemplates articulation of suburban trunk line operation, city street railway service, service by bus, transportation by taxi, and a rapid transit system. This development was the subject of a six-page story in the May issue. It is in the working out of this program that former Association Secretary Welsh will have a hand. Guy C. Hecker, who succeeded Mr. Welsh with the association, had his baptism of fire as secretary at the convention last October. St. Louis also appears to be coming along promisingly. The Transit Survey Commission there under R. F. Kelker, Jr., favors unification. If, as, and when the program is carried out, the recent purchase of the independent bus system by the holding company which controls the railway will be advantageous. There the skip-stop plan has been extended successfully by the railway. In San Francisco the purchase of the Market Street Railway by the city and the unification of that property with the lines of the present municipal railway are still under discussion, with the purchase price the chief stumbling block. Mr. O'Shaughnessy, the city engineer, did not gloss over the facts about the financial condition of the municipal railway. Seattle is still talking about articulation, regulation of taxis and what to do with the municipal railway. The municipal railway system is badly run down. It has borrowed from the water fund. Still the city raised trainmen's wages only to turn around and arrange with Stone & Webster for a two-year moratorium on the payment of the principal sum of the purchase price so as to obtain funds for rehabilitation. The Mayor hopes eventually to refinance the entire purchase on a long-term basis. The original purchase plan contemplated that the city would pay for the system out of earnings. The ills of the Seattle system are blamed on the two experiments with 5-cent fares. In other words, Seattle was to settle on the pay-as-you-go plan, but it isn't going anywhere.

While we are wandering around, there's the Detroit municipal system. The jitneys have been restrained. Service installed by the city to replace them—a service with small-capacity vehicles—seems to be highly satisfactory. City officials at Detroit are apparently undaunted by the defeat of the proposal to build a subway. In the matter of dealing with the parkers,

Detroit apparently has seen the light
And relieved itself of its traffic plight.
How it refused longer to be fooled
Was told to you by Harold Gould.

In New York the new subway to be run by the municipality is nearing completion. As Phillips put it in the New York *Sun*, the streets are so torn up for subway construction that the wags are beginning to



Messrs. McCarter and Boylan keep on gathering in the buses

speak of it as a holey city. Wisely the city decided to purchase power for the new lines rather than to attempt to generate its own current. It is this system which will be unified with the privately-owned lines if a legislative program can be enacted satisfactory to Sam Untermyer, Jimmy Walker, Tammany Hall and the officers of the railways, including President Hedley of the Interborough. Well, the surface lines in Brooklyn were brought together by a consolidation in which the Brooklyn & Queens Transit Corporation was created. Incidentally, Clint Morgan, the former chief operating official of the Brooklyn City Railroad, jumped from the management end of the business to the selling end, with the Cincinnati Car Corporation. The United States Supreme Court remanded the Interborough's suit for a 7-cent fare back to the state courts. Meanwhile, Mr. Amster, as head of the stockholders' protective committee of the Manhattan Railway, and Mr. Hedley continue their passages at arms. In Philadelphia

On banks, trolleys, buses and cabs
Mitten Management still keeps tabs.
It does it quite well beyond all doubt
For it knows exactly what it's about
Although old Philly's daily newspapers
Claim to have uncovered some company capers.

Mr. Storrs, the chairman of the executive committee of the United Railways & Electric Company, Baltimore, did a good stroke in arranging new financing for that company. Baltimore, too, grappled successfully with the parking problem, and a milk company ordered its drivers to respect the rights of the street cars. Buses are being run there successfully in a 25-cent service. A new franchise was awarded in Youngstown, Ohio, and in Toledo the Milner service-at-cost grant was modified.

With one or two exceptions things were quiet in the South. Employees of the New Orleans Public Service, Inc., took it into their heads suddenly to strike on Aug. 2, during negotiations looking toward a new working agreement. After being on strike many weeks, and after the company felt it could no longer keep open the offer it made for the men to return, the strikers voted to accept the company's terms. This did not happen, however, until the men had sorrowfully learned that in ignoring the good offices of President Mahon and officials of the American Federation of Labor they had followed local labor prophets into the wilderness. There was also a



Service in Cleveland is being co-ordinated under President Alexander



From Brooklyn to Cincinnati —From selling service to selling the instruments of service

little fracas in El Paso, Tex. The railway there operates over the international bridge into Juarez, Mexico. Suddenly the Mexicans staged a shooting bee. Just as suddenly the cars scooted for home, there to remain until the insurrection had died down. This incident recalls the case of the Mayor who frantically wired to the Governor for Texas Rangers, to restore peace after a reign of terror started by gunmen. A special train came down from the capital and one lonely ranger stepped out.

"Where's the rest of the outfit?" demanded the Mayor and the sheriff.

"Rest, hell," replied the ranger mildly, "you ain't got but one riot going on here, have you?"

Jack Shannahan is doing quite well in Omaha. Remember the good-natured editorial, headed "The Miracle Man," in the *Morning World-Herald*. Even the New York *Times* had a feature about him. He's been adopted into the Ogallala Sioux Indian Tribe and given the tribal name of Hounska-Kle Ska, or spotted breeches. Mr. Shannahan still has his hands full with the question of the sale of the bridge between Omaha and Council Bluffs, owned by his company, to the cities, but promise is ahead for a settlement. He has cleared up the franchise matter, and has put into effect a rerouting plan, based on the survey by Ross Harris. That's working out well now, but, as is natural in a major move of this kind, there was some dissatisfaction and much good-natured joshing at first. It so happened that on the evening of the first day of the change the Ad-Sell League met. Since some of its members were affected by the rerouting the following song was received with enthusiasm:

"Show us the way to go home,
We're tired and want to go to bed;
We had a little ride about an hour ago
But we didn't know where it led.
We've got a dizzy dome,
No more do we want to roam
In Mr. Shannahan's merry-go-round
Show us the way to go home."

The Des Moines property changed hands and the men agreed to the modification of the terms of a long-time wage agreement which contained an iron-clad clause against one-man cars. It would appear now that a program of rehabilitation for Des Moines is ahead, no less efficacious than the one now under way in Omaha. The



Omaha's miracle man is made a Sioux Indian

Roanoke Railway & Electric Company has also done some unusual things in rehabilitating its property and in selling the service to the public, notably in its house-to-house campaigns. The Boston Elevated Railway has been quick to seize the opportunities presented by the traffic problem to win back many of its passengers. In this work it has turned to advertising for assistance.

Posters and printed matter played a prominent part in putting over the idea of the Pittsburgh campaign, which was called "Loftis Testimonial Week." The slogan, "For the Love of Mike Be Careful," was reproduced on an attractive placard which was posted at all carhouses during the week.

Penn-Ohio won the Class A Safety Medal for 1929, while the Brady Award in Class B went to the Tampa Electric Company and in Class C to the Tide Water Power Company. Many other companies did effective newspaper advertising, particularly safety advertising. A very effective piece of advertising was the historical and industrial film prepared by the Virginia Electric & Power Company to stimulate home interest in Virginia and the industries of Virginia. Fred Cummings, of the Eastern Massachusetts, made a notable contribution to the subject of merchandising with his article in the issue of Sept. 14.

According to Secretary of Commerce Lamont, traffic congestion costs the nation $2,000,000,000 a year. The full story of Chicago's effort to curtail parking was told in detail by Charles Gordon in an elaborate article in the JOURNAL for Feb. 23. The victory in securing proper traffic control and in abating the parking menace is not going to be won in a day. Of course, restrictions will help, but better yet will it be when drivers realize the significance of the little poem run by the Northern Ohio Power & Light Company, Akron, in *Service News:*

> I'm blocked in front, I'm blocked behind,
> Till I'm afraid I'll lose my mind.
> The hours that I have spent right here,
> Watching street cars pass so near,
> Have taught me what I won't forget—
> This parking business is all wet.

The Pittsburgh car was a notable contribution to the art during the year, as were the new cars for Louisville, Albany and Detroit. Comment on cars would not be complete without reference to the increase in the interest in the trackless trolley, reflected in the added installations in Salt Lake City and New Orleans, and in the numerous proposals for the use of this vehicle, notably in Chicago and Detroit.

One of the best studies of the interurban problem was the paper by Dr. Thomas Conway, president of the Cincinnati, Hamilton & Dayton Railway, entitled "Courage, Faith and Vision Will Advance Interurbans," presented at the Atlantic City convention. There have been several instances of the extension of the pick-up and delivery service by the interurbans, in the Central West and the roads on the Coast notably on the system at Los Angeles.

In most large cities, and many small ones as well, all business faces the problems of congestion and deficiency in efficient local transportation. These are community and public problems that require the application of sound principles for their solution. Electric railways are endeavoring to improve their facilities and service despite a long period of inadequate earnings and consequent restricted credit. That's preparedness for you and preparedness is merely the act of wearing spectacles to breakfast, when you know you're going to have grapefruit.

An officer once reported to Lord Kitchener that he had been unable to carry out an assigned task and gave his reason. Kitchener made this reply: "Your reason for not doing it is the best I ever heard. Now go ahead and do it." In this industry at this time it's the courage of the Vikings that's needed. It was not the Roman army that conquered Gaul, but Caesar. It was not the Carthaginian army that made Rome tremble in her gates, but Hannibal. It was not the Macedonian army that reached Indus, but Alexander. The problems of economics are not settled by oratory.



New Orleans men allowed themselves to be led into labor's wilderness by false local prophets

Rolling Stock Purchases LARGELY INCREASED

Nearly 1,300 passenger cars, 130 freight and service cars and 77 electric locomotives were bought during 1929 by the electric railways. Cars for handling heavy traffic on city surface lines predominated. Large car orders also were placed for rapid transit lines and for electrified suburban service. Interurbans purchased comparatively few new cars

By

TH. M. van der STEMPEL

Assistant Editor *Electric Railway Journal*

PURCHASES of new rolling stock by the electric railways during 1929 exceeded those of 1928 by a large amount. A total of 1,496 new cars and locomotives were bought last year as compared with 897 the year before. Included in the total for 1929 are 663 for city surface lines, 300 for rapid transit lines, 240 for electrified suburban service and 79 for interurbans. More than 130 freight and miscellaneous cars were ordered during the year just ended and 77 electric locomotives. In 1928, a total of 601 cars were bought for city surface lines and 93 for interurban service. In that year orders were placed for 171 freight and service cars and 32 electric locomotives.

A total of 58 electric railway companies are listed among the purchasers in 1929 as compared with 46 the preceding year. Of this number 49 are located in the United States and nine in Canada. Of the number of purchasers in this country 24 bought cars for city service and fifteen for interurban service. In Canada the figures are eight and two respectively. Three companies in the United States added to their equipment for electrified suburban service.

The largest single purchase of cars during the year just ended was 300 for the city-owned rapid transit lines in New York City. Next in size was the order for 141 multiple-unit cars for the electrified suburban service of the Lackawanna Railroad. Among the large orders for surface line cars placed last year were 106 for the Cleveland Railway, 101 for the Brooklyn & Queens Transit Corporation and 100 each for the Department of Street Railways, City of Detroit, and the Chicago Surface Lines. The Montreal Tramways placed an order for 50 cars, of which 25 are motorized and 25 trail. The only other order placed during 1929 for trail cars was that of the Washington, Baltimore & Annapolis Electric Railroad for nine such units, making the total for the year 34 as compared with 20 trailers ordered in 1928. The Market Street Railway of San Francisco built 25 cars in its own shops. The Lynchburg Traction & Light Company bought 20 cars for city service. Besides the purchase of passenger cars already mentioned, three orders of 15 cars each were placed during the year, one of 13 cars, seven of 10, one of 7, two of 6, five of 5, one of 4, three of 3, four of 2 and eleven orders for single cars.

Large capacity double-truck cars for two-man operation predominated in the purchases last year. The 307 cars ordered for Cleveland, Detroit and Chicago are straight two-man cars. The 25 motor cars purchased by the Montreal Tramways are designed to operate as one-man cars during non-rush hours but are used for train service at rush hours with the 25 trail cars bought by the same railway. All of the 101 cars ordered by the Brooklyn & Queens Transit Corporation are designed for one-man operation, as also were those for the Lynchburg Traction & Light Company. The other orders were divided between one-man and one-man two-man design. Only two single-truck cars were bought, one by the Third Avenue Railway and the other by the railway in Porto Rico.

Summary of Car Purchases

	United States	Canada	Total
Number of companies reporting purchase of new cars	49	9	58
CITY SERVICE			
Single truck	1	...	1
Double truck	851	86	937
Trailers		25	25
Total cars for city service	852	111	963
INTERURBAN SERVICE			
Motor cars	59	10	69
Trailers	9	1	10
Express and freight	130	...	130
Miscellaneous	7	...	7
Total cars for interurban service	205	11	216
MULTIPLE-UNIT SUBURBAN CARS	240	...	240
ELECTRIC LOCOMOTIVES	77	...	77
Grand total	1,374	122	1,496

Rolling Stock Ordered During 1929

Name of Company	No.	Class	Type of Service	Motor or Trailer	Single or Double Truck	Length Over All Ft. In.	Total Weight Lbs.	Number of Motors	Seating Capacity
California									
San Francisco, Napa & Calistoga Ry.	1	Bag. & Mail	Interurban	Trailer	Double	56— 0			
Pacific Gas & Electric Co., Sacramento	12	Passenger	City	Motor	Double	41— 6½		2	44
Sacramento Northern R.R.	1	Locomotive					120,000		
Connecticut									
New York, New Haven & Hartford R.R.	10	Passenger	Suburban	Motor	Double	79— 7½		4	80
Delaware									
Delaware Electric Power Co.	10	Passenger	City	Motor	Double	42— 1½	35,360	4	44
Illinois									
Chicago Surface Lines	100	Passenger	City	Motor	Double	48— 4	44,440	4	60
Illinois Traction Co.	4	Locomotives							
	100	Freight	Interurban	Trailer	Double				
Indiana									
Gary Rys.	2	Passenger	Interurban	Motor	Double	44—10	40,000	4	50
Indianapolis & Southeastern R.R.	3	Passenger	Interurban	Motor	Double	45— 2	38,000	4	40
Iowa									
Des Moines Railway	10	Passenger	City	Motor	Double				52
Fort Dodge, Des Moines & So. R.R.	1	Locomotives					150,000		
Kentucky									
Kentucky Traction & Terminal Co.	1	Passenger	Interurban	Motor	Double				44
Louisville Railway	1	Passenger	City	Motor	Double	43— 3	33,993	4	51
	1	Passenger	City	Motor	Double	46— 3	37,980	4	51
	1	Passenger	City	Motor	Double	41— 2¾	29,000	4	47
Maryland									
Washington, Baltimore & Annapolis R.R.	9	Passenger	Interurban	Trailer	Double	58— 1	65,200		58
	1	Express	Interurban	Motor	Double	55— 0		4	
Massachusetts									
Greenfield & Montague Transportation Area	2	Passenger	Interurban	Motor	Double	39— 1½	33,000	4	44
Union Street Railway, New Bedford	12	Passenger	City	Motor	Double	44— 0	32,000	4	54
Michigan									
Department of Street Rys., Detroit	101	Passenger	City	Motor	Double	58— 5		4	52
Missouri									
St. Louis Public Service Co.	1	Passenger	City	Motor	Double				62
New Jersey									
Delaware, Lackawanna & Western R.R.	141	Passenger	Suburban	Motor	Double	71— 0	148,000	4	84
New York									
Brooklyn & Queens Transit Corp.	100	Passenger	City	Motor	Double	45— 6	34,000	4	53
	1	Passenger	City	Motor	Double	45— 0	27,500	4	52
City of N. Y. Board of Transportation	300	Passenger	City	Motor	Double	60— 6	85,000	2	60
New York Central R.R.	10	Passenger	Suburban	Motor	Double			2	100
	42	Locomotives	Freight					6	
Third Avenue Ry.	1	Passenger	City	Motor	Single	38— 9¾	26,980	2	44
United Traction Co., Albany	1	Passenger	City	Motor	Double	42— 8¾	32,000	4	44
Long Island R.R.	†40	Passenger	Suburban						
North Carolina									
North Carolina Pub. Serv. Co., Greensboro	5	Passenger	City	Motor	Double	41— 5	34,200	4	41
Ohio									
Cincinnati, Hamilton & Dayton R.R.	10	Passenger	Interurban	Motor	Double	43— 9	45,000	4	44
	6	Service	Interurban	Motor					
	6	Freight	Interurban	Trailer					
Cleveland Railway	100	Passenger	City	Motor	Double	53— 6½	47,000	4	55
	6	Passenger	City	3 Duplex units	3 Trucks per unit				100
Cleveland Union Terminals Company	22	Locomotives	Passenger			80— 0	204,000		
Dayton & Troy Electric Railway	4	Passenger	Interurban	Motor	Double	45— 2	40,000	4	48
Indiana, Columbus & Eastern Traction Co.	15	Freight	Interurban	Trailer					
	8	Freight	Interurban	Motor					
Lima-Toledo R.R.	20	Passenger	Interurban	Motor	Double			4	44
Youngstown Municipal Railway	13	Passenger	City	Motor	Double	40— 6	30,000	4	45
†Lorain Street Railroad	10	Passenger	City	Motor	Double	41—10½	36,000	4	48
Oklahoma									
Oklahoma Railway	10	Passenger	City	Motor	Double	33— 5	26,060	4	36
Pennsylvania									
Altoona & Logan Valley Electric Ry.	5	Passenger	City	Motor	Double	42— 6	36,200	4	54
Pennsylvania Railroad	*36	Passenger	Suburban	Motor	Double				72
	* 3	Passenger	Suburban	Motor	Double				52
	2	Locomotives							
Pittsburgh Railways	1	Passenger	City	Motor	Double	45— 3	27,000	4	42
Scranton Railway	10	Passenger	City	Motor	Double	42— 6	35,900	4	54
York Railways	1	Passenger	Interurban	Motor	Double				50
Tennessee									
Nashville Interurban Ry.	2	Passenger	Interurban	Motor	Double	44— 2	39,000	4	45
Virginia									
Lynchburg Traction & Light Co.	20	Passenger	City	Motor	Double	40—10	34,680	4	41
Washington									
Great Northern	4	Locomotives	Passenger						
Yakima Valley Transportation Co.	3	Passenger	City	Motor	Double	40—10		4	40
West Virginia									
Monongahela West Penn Pub. Serv. Co.	3	Passenger	Interurban	Motor	Double	47— 3	35,000	4	48
Newell Bridge & Ry. Co.	2	Passenger	City	Motor	Double	45— 3	32,220	4	46
Wisconsin									
Milwaukee Electric Ry. & Light Co.	15	Passenger	City	Motor	Double	45— 0	38,840	4	55
Wisconsin Power & Light Co.	1	Locomotive							
Porto Rico									
Porto Rico Ry., Light & Power Co.	1	Passenger	Interurban	Motor	Single				28
DOMINION OF CANADA									
British Columbia Electric Ry.	15	Passenger	City	Motor	Double	46— 2	39,200	4	50
Calgary Municipal Ry.	6	Passenger	City	Motor	Double	46— 2	39,400	4	53
Hamilton Street Ry.	12	Passenger	City	Motor	Double				44
Hydro-Electric Power Commission	4	Passenger	Interurban	Motor	Double	51— 2	58,000	4	50
	1	Passenger	Interurban	Trailer	Double	51— 2	44,500		49
Montreal Tramways	25	Passenger	City	Motor	Double	46— 2	37,000	4	42
	25	Passenger	City	Trailer	Double	46— 2			57
Quebec Railway, Light & Power Co.	15	Passenger	City	Motor	Double	41— 2	38,700	4	40
	6	Passenger	Interurban	Motor	Double	65— 0	85,000		37
Regina Municipal Ry.	7	Passenger	City	Motor	Double	41— 1½	34,000	4	49
Saskatoon Municipal Railway	5	Passenger	City	Motor	Double	39— 3	30,400	4	41
Winnipeg Electric Co.	1	Passenger	City	Motor	Double				52

*Converted from steam to electric. †Motorized trailers.

As is usual, there was considerable variation in the dimensions, weights and seating capacities of the cars ordered last year. The length of the double-truck cars for city service varies between 33 ft. 5 in. and 53 ft. 6½ in., the average being about 43 ft. 6 in. Weights for this type of car range from 26,000 lb. to 47,000 lb., with an average of approximately 36,500 lb. Seating capacities vary from 36 to 62 per car. Among the interurban motor passenger cars there is less variation, the average length being about 48 ft. 8 in. with a weight of 40,916 lb. The cars purchased for New York rapid transit service have a length of 60 ft. 6 in. and weigh 85,000 lb. Even larger than these are the cars bought for the electrified suburban service of the Lackawanna Railroad, their length being 71 ft. and their weight 148,000 lb. Other additions to motorized cars for electrified suburban service are 39 cars which are being converted by the Pennsylvania Railroad from steam operation to electric operation, and 40 cars of the Long Island Railroad which are being motorized.

New Rolling Stock Ordered Since 1907

Year	Passenger Cars City	Passenger Cars Interurban	Freight and Miscellaneous Cars	Electric Locomotives	Total
1907	3,483	1,327	1,406	(a)	6,216
1908	2,208	727	176	(a)	3,111
1909	2,537	1,245	1,175	(a)	4,957
1910	3,571	990	820	(a)	5,381
1911	2,884	626	505	(a)	4,015
1912	4,531	783	687	(a)	6,001
1913	3,820	547	1,147	(a)	5,514
1914	2,147	384	479	(a)	3,010
1915	2,072	336	374	(a)	2,782
1916	3,046	374	491	31	3,942
1917	1,998	185	223	49	2,455
1918	1,842	255	278	44	2,419
1919	2,129	128	172	18	2,447
1920	2,889	227	465	17	3,598
1921	1,059	129	81	7	1,276
1922	2,910	187	405	34	3,536
1923	2,915	427	595	92	4,029
1924	1,985	538	1,538	31	4,092
1925	1,054	320	238	47	1,659
1926	1,249	309	264	60	1,882
1927	824	121	363	40	1,348
1928	601	93	171	32	897
1929	963	319	137	77	1,496

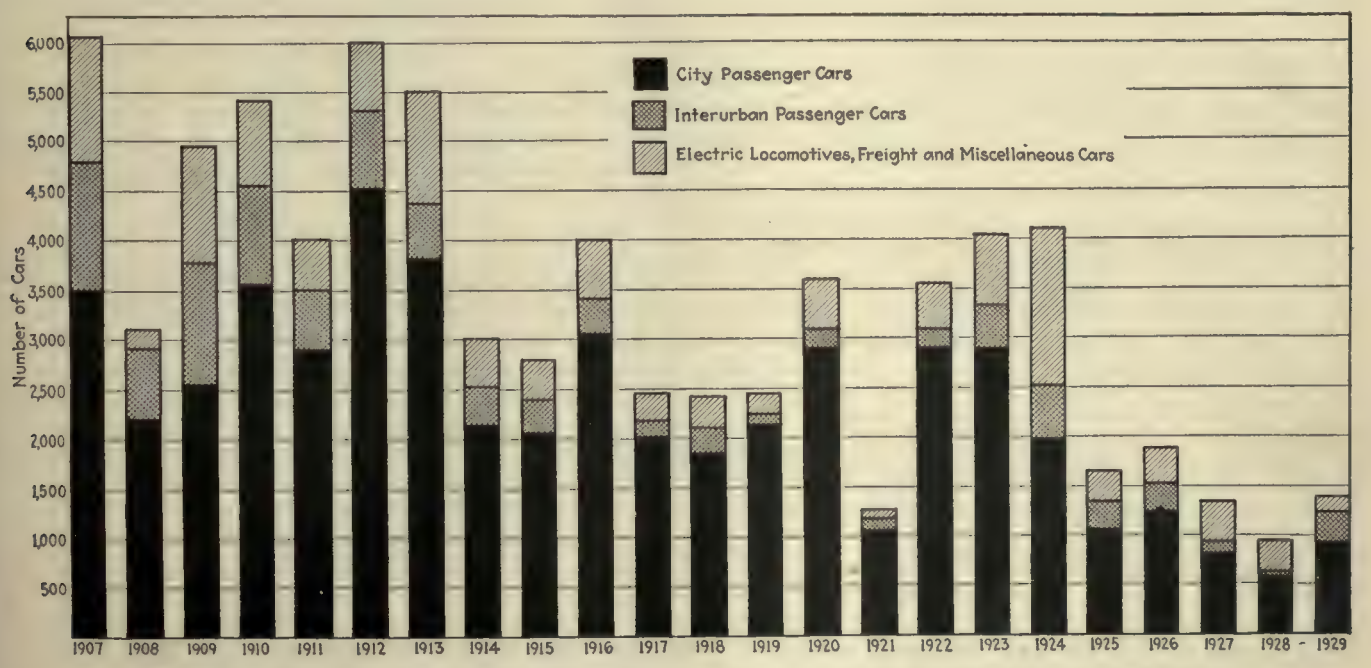
(a) Included in "Freight and Miscellaneous Cars."

Number of Cars Owned by Electric Railways by Years

Year		Passenger Motor	Passenger Trailer	Freight Motor	Freight Trailer	Locomotives	Service	Others	All Cars
1920	United States.	77,722	6,027	1,215	7,441	751	5,723	6,809	105,688
	Canada	4,269	136	133	612	53	53	714	5,970
	Total	81,991	6,163	1,348	8,053	804	5,776	7,523	111,658
1921	United States.	77,921	6,142	1,324	7,712	760	7,005	4,754	105,618
	Canada	4,348	138	134	538	54	67	717	5,996
	Total	82,269	6,240	1,458	8,250	814	7,072	5,471	111,614
1922	United States.	75,442	7,624	1,375	7,903	772	8,761	2,795	104,672
	Canada	4,413	312	143	575	56	168	531	6,198
	Total	79,855	7,936	1,518	8,478	828	8,929	3,326	110,870
1923	United States.	75,249	7,423	1,712	8,442	814	8,971	2,435	105,046
	Canada	4,262	365	134	646	62	213	448	6,130
	Total	79,511	7,785	1,846	9,088	876	9,184	2,883	111,176
1924	United States.	75,678	6,768	1,790	9,016	799	9,092	2,491	105,634
	Canada	4,267	364	136	642	62	212	442	6,125
	Total	79,945	7,132	1,826	9,658	861	9,304	2,933	111,759
1925	United States.	74,898	6,737	1,760	9,138	809	9,004	2,370	104,716
	Canada	4,311	367	130	637	67	232	463	6,207
	Total	79,209	7,104	1,890	9,775	876	9,236	2,833	110,023
1926	United States.	73,694	7,050	1,960	9,850	870	8,731	2,600	104,755
	Canada	3,945	368	125	629	67	313	380	5,827
	Total	77,639	7,418	2,085	10,479	937	9,044	2,980	110,582
1927	United States.	72,030	7,355	2,265	10,500	910	8,474	2,950	104,484
	Canada	3,878	354	297	618	64	382	57	5,650
	Total	75,908	7,709	2,562	11,118	974	8,856	3,007	110,134
1928	United States.	69,963	7,660	2,488	11,037	948	8,208	3,286	103,590
	Canada	3,706	364	249	472	62	419	51	5,323
	Total	73,669	8,024	2,737	11,509	1,000	8,627	3,337	108,913
1929	United States.	67,035	7,001	1,857	11,342	946	8,749	3,325	100,255
	Canada	3,831	368	244	469	65	449	49	5,475
	Total	70,866	7,369	2,101	11,811	1,011	9,198	3,374	105,730

New York led all other states in the amount of new rolling stock purchased for electric railway operation last year with a total of 411 cars and 42 electric locomotives. This numerical superiority was due largely to the big order for rapid transit cars and the order of 101 surface cars for Brooklyn. Ohio was second with a total of 146 cars and 26 electric locomotives. Other states which bought more than 100 cars included New Jersey, Michigan and Illinois.

At the same time that the electric railways bought these 1,404 cars, 2,325 old cars were junked or otherwise disposed of. This is by far the largest number that has been scrapped in any year of record. The next highest



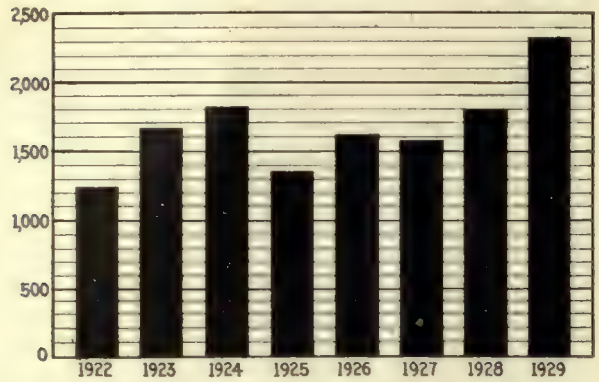
Total purchases of electric railway rolling stock increased to a marked extent in 1929 over the 1928 figure

number reported was 1,853 in 1924, followed closely by 1,819 in 1928. The relative number of cars scrapped in each of the last seven years is shown in an accompanying diagram.

Interesting Developments in Design

Aside from the trends of the past year as shown by the statistics prepared in accompanying tables, interesting developments have occurred in design. Much effort has been spent by the manufacturers in the development of lighter and quieter trucks. Particular attention has been paid to securing faster acceleration and retardation. Some of the new cars equipped with high-speed motors accelerate at a rate of 3 m.p.h.p.s. and can attain a free running speed as high as 40 m.p.h. Improvements in braking have made it possible to secure a rate of retardation as high as 3½ or 4 m.p.h.p.s. without discomfort to the passenger. Foot control and automatic acceleration appear to be regarded favorably.

In several instances the cars ordered during the year



More than 2,300 old cars were scrapped in 1929, the largest number in any year of record

represent a radical departure from established precedent. While the majority of the orders are for equipment that follows more or less standard design, more attention has been given than ever before to improved general appearance. Designers have made a serious effort to create vehicles that are in keeping with their surroundings on the modern city street, but which will be an outstanding and desirable element in the picture. Attention has been directed to the balance in the general proportions, to lines and colors, to the curves of the roof, proportions of windows, shape of the ends, and to innumerable minor details that a few years ago were given little or no attention.

Greater attention also has been given to interior design and appointments, as well as to the exterior. Seats have been improved. Lines and colors have been selected to harmonize and to create a favorable impression in the mind of the rider. Care has been taken to facilitate entrance and exit, and to eliminate congestion near the doors and fare box.

Car Weights Greatly Reduced

Weights of cars purchased during the year have been reduced a great deal from the practice of a few years ago. Among the extremely light cars are one for Louisville which weighs 29,000 lb. and seats 47 passengers, or 620 lb. per passenger; the Union Street Railway of New Bedford, Mass., which weighs 32,000 lb. and seats 52 passengers, or 616 lb. per passenger; Pittsburgh Railways, weighing 27,000 lb. and seating 42 passengers, or 640 lb. per passenger; Scranton Railways, weighing 35,900 and seating 54 passengers, or 665 lb. per passenger. By far the lightest car listed is that built for the Brooklyn & Queens Transit Corporation, which, with a weight of 27,500 lb., seats 52 passengers, making the weight per passenger 530 lb.

While these examples of light-weight cars are in general sample designs, enough have been built to show that it is practicable to use in their construction those principles which have been expounded by the advocates of radical improvements. Practically all the car builders are represented in the list of these improved designs, and all the builders are using methods once considered revolutionary. Among these is the use of light-weight metals for structural parts as well as for trimmings. It is by the use of such methods that the weights have been reduced so radically.

It is not felt that the ultimate in weight reduction has been reached, by any means. Further study will make it possible not only to use light-weight metals as they have been employed in recent designs, but to modify other parts such as motors, controllers and air brake equipment to a greater extent than anything that has yet been attempted. Such changes will be possible on account of the very much lower weight of the body itself. The trucks are capable of redesign for less weight, as has been demonstrated in a few sample units. These changes in turn make it possible to increase the rates of acceleration and braking, even beyond the limits which have been referred to earlier in this article, and to do it without the necessity of having recourse to more powerful equipment.

Much Interest Shown in Special Designs

The purchase of special designs of cars has been made in larger quantities during the year just closed than in any similar period. This indicates that the interest taken in the subject is not merely a passing fancy, but that managements are becoming more and more alert to the necessity for taking advantage at once of the possibilities that lie in such changes. At the close of the year it is to be expected that more information as to the performance of these units in service will be available, and will form a basis on which to judge the merits of the several innovations incorporated in the recent designs. Such results are awaited with interest by all live operating men. It is not easy to predict in advance the exact effect of changes in design in passenger carrying vehicles but it is evident from past experience that the progress in car improvement has been productive of beneficial results.

Statistics given in the accompanying tables of rolling stock were obtained from replies to questionnaires sent to all electric railways in the United States and Canada. Replies were received from companies representing more than 97 per cent of the total track mileage. Through the co-operation of the manufacturers, lists of cars built by them during the year were furnished so that the replies received from railways could be checked very carefully. In a few cases where replies were not received from electric railways themselves, the information furnished by the car manufacturers has been used. Replies were received from all car manufacturers. In addition to the information obtained from these two sources, the files of Electric Railway Journal have been used extensively. Particular care has been used to verify figures which appeared doubtful and it is believed that the final data are complete and accurate.

Interest Revived in Trackless Trolley Operations

During the past two years this type of service has enjoyed a marked increase in popularity. More trackless trolleys were bought in 1929 than in any recent year. Seven companies are now operating 65 such vehicles. A synopsis of all operations since the first installation in 1910 is presented

DEVELOPMENTS of the past year indicate that the trackless trolley is again finding favor as a local transportation vehicle. Eight years ago it was the subject of considerable experimentation and much interest was shown in its possibilities. Numerous systems were established at the time by the railways, but abandonments during the period from 1923 to 1927 showed that it was losing popularity. With the coming of 1928, however, the manufacturers of equipment brought out new designs, resulting in a revival of interest in the trackless trolley. Indeed, the new models were so far removed from the old vehicles known as trackless trolleys that the manufacturers were reluctant to call them as such and termed them "electric coaches" and "trolley buses."

On Sept. 9, 1928, the Utah Light & Traction Company, Salt Lake City, placed ten electric coaches in service on a route 3.45 miles in length, replacing a former street car line. So successful did this original line prove to be, that the management on Dec. 4, 1929, added a second line, 4.74 miles in length, using fifteen additional vehicles.

New Orleans Established Line in 1929

A second recent installation of trolley buses in the United States is that of the New Orleans Public Service, Inc., which started a shuttle route of 1.37 miles in November, 1929, using two vehicles. Knoxville is expected to have the third installation when it opens up a route of approximately 5 miles the latter part of February or early in March, using four electric coaches.

Several other electric railways are considering installations in the near future. Of the pending plans, those of the Chicago Surface Lines to install trackless trolleys on two feeder lines in the northwest part of Chicago stand out as of particular significance. If this company obtains the desired permission to serve this district, it will purchase from 60 to 100 vehicles. Another city, in the South, is also awaiting only a court decision to start an operation of electric coaches.

It was recently announced by the general manager of the Department of Street Railways, Detroit, Mich., that he intended to propose the purchase of a number of trackless trolleys for trial purposes in that city. Should the experiment prove successful, the management plans to extend the use of trackless trolleys. Reports received by this paper from three other large properties and three smaller ones state that they are considering similar installations.

New Equipment Responsible for Renewed Interest

It has long been felt by many operators that the trackless trolley has a definite place in the field of local transportation. Until recently, however, there was a strong feeling that the equipment available was not satisfactory. As a result, only a few of the installations made with earlier equipment are now in operation. Awkward in appearance, hard riding and subject to many mechanical troubles, the early trackless trolley was a very unattractive vehicle. Development of the Versare, Twin Coach and A.C.F. Metropolitan type of buses removed the principal objections to the earlier designs, so far as the riding qualities and arrangement of equipment were concerned. At the same time light-weight, high-speed motors and control suitable for this type of vehicle became available as a result of developments in car design. Further refinements in the collection of current and the overhead removed several other objections.

Seven Railways Now Using Trackless Trolleys

At the present time seven companies are operating trackless trolleys in the United States, its possessions and Canada. These companies are operating 65 vehicles over 27.95 miles of one-way route. When service is started in Knoxville, the operating companies will be increased to eight, the number of vehicles to 69 and the mileage to approximately 33. Cities now operating are Baltimore, Md.; Philadelphia, Pa.; Rochester, N. Y.; Cohoes, N. Y.; Manila, P. I.; Salt Lake City, Utah, and New Orleans, La.

During the year 1929 a total of 20 vehicles were purchased, fourteen by the Utah Light &Traction Company, Salt Lake City; two by the New Orleans Public Service, Inc., and four by the Knoxville Power & Light Company. All of these except those for Knoxville are now in operation. Route extensions for the year totaled 6.11 miles, 1.37 miles of this being accounted for in the new line in New Orleans and 4.74 miles being the second line established by the Utah Light & Traction Company.

Of the seven companies now operating trackless trolleys, the system of the United Railways & Electric Com-

pany of Baltimore is the oldest. This line, established in July, 1922, is 6.6 miles in length and uses three vehicles, two of which are in active operation and one of which is held in reserve. They are used in feeder service between the end of a car line and a sparsely settled section in the country, known as Randallstown. Trackless trolleys were selected for this service largely as an experiment and also because of their low cost. Real estate owners in the territory to be served requested that a permanent form of transportation be installed to aid in the development of the section and the company complied with their wishes.

Philadelphia has the second oldest system in the country with a line which was established on Oct. 14, 1923. This route of 2.8 miles serves a rapidly developing industrial and residential district in the southern part of the city. Ten vehicles are used. Need for the immediate service was the reason that prompted the Philadelphia Rapid Transit Company to install the trackless trolley system on a street having steam railroad tracks. These would have required considerable time for removal before electric railway tracks could have been installed. Also, because the district was not yet fully developed, the cost of an electric railway system would have been prohibitive.

Closely following the Philadelphia installation was that of the New York State Railways at Rochester, N. Y. It established a crosstown city service through a densely populated and important industrial section on Nov. 1, 1923. Twelve vehicles are used on the 3.5-mile route. Since the line passes through a densely populated district and crosses five street car lines, the company felt that trackless trolleys would provide the most economical form of transportation.

Belt Car Line Replaced in Cohoes

On Nov. 2, 1924, the Capitol District Transportation Company, a subsidiary of the United Traction Company of Albany, started operation of a 2.53 mile route in Cohoes, N. Y., with four vehicles. The company was faced with a large expenditure for street reconstruction and paving over a considerable part of a belt line, and substituted the electric coaches for this reason. It also selected this form of transportation partly so that it could shorten the distance taken by certain lines in reaching the business center of the city. Reducing the track and paving maintenance costs was also a factor.

Immediate need for reconstructing the street car tracks on one of its lines and the high cost of gasoline in the Philippines caused the Manila Electric Company

Present Trackless Trolley Operations in the U. S., its Possessions and Canada

Company	City	Equipment Number and Type	Present One-Way Mileage	Date Started	Type of Service	Reason for Selection	Remarks
United Railways & Electric Company of Baltimore.	Baltimore, Md.	3 Brill (2 in active operation, 1 held in reserve).	6.60	July, 1922	Feeder service, between end of a car line and Randallstown, a sparsely settled section in the country.	Selected largely as an experiment and because of their low operating cost. Territory was not densely populated but real estate owners desired a permanent form of transportation.	Performance of these trackless trolleys is satisfactory.
Philadelphia Rapid Transit Company.	Philadelphia, Pa.	9 Brill B-3 type, 28 pass. 1 Berg B-4 type, 27 pass. Body by Trackless Trolley Corp.	2.80	Oct. 14, 1923	Crosstown service in south part of city, serving docks and industrial plants in rapidly developing industrial and residential sections.	Because of abandoned steam railroad tracks in street it would have taken too long to substitute street car tracks. Tidewater Docks, employing 2,000, and other plants needed service immediately. Also, territory was not sufficiently developed to warrant investment in tracks.	No supplement or curtailment since original installation. General performance has been quite satisfactory. Gas-electric bus felt to have advantage in flexibility and economy.
New York State Railways.	Rochester, N. Y.	12 Brockways, 25 pass. (Originally 5 had electric motors and 7 gasoline engines. All equipped with motors now.)	3.50 (Originally only 3.00.)	Nov. 1, 1923	Crosstown city service. Connects large industrial and residential sections on either side of a river. Crosses 5 car lines.	Economical operation principal reason.	Company satisfied with their performance.
Capitol District Transportation Company, subsidiary of United Traction Company.	Cohoes, N. Y.	4 Brockway chassis. Wason bodies.	2.53	Nov. 2, 1924	City.	Replaced belt street car line. Company was faced with larger expenditure for street reconstruction along considerable part of line. Change in route brought many residents closer to center of city. Also to reduce track and paving upkeep.	Performance satisfactory.
Manila Electric Company.	Manila, P. I.	8 Twin Coaches, 40 pass.	2.96	April, 1928	Feeder service on heavy traffic street from city limits to two street car lines which are routed to business center of city.	Replaced street cars on a line the tracks of which needed reconstructing. Economy of electric operation as compared to gasoline in Philippines influenced choice of trolley buses.	Giving satisfactory service at low costs, both operating and fixed.
Utah Light & Traction Company	Salt Lake City, Utah.	26-total. 18 Versares. 8-Twin Coaches. (7 Versares of Cincinnati Car Corporation and 7 Twin Coaches added in 1929.)	8.19 total First line 3.45 Second line 4.74	Sept. 9, 1928 Second line Dec. 4, 1929	City service in well built up residential districts and main business district of city.	Necessity of reconstructing and repaving four miles of track. Attendant future paving liabilities. Company believed electric coach to be most economic type of vehicle, at same time offering comfort and speed in a new, attractive vehicle	Company and public so pleased with first line that second was added. Operating costs low. Riding increased.
New Orleans Public Service, Inc.	New Orleans, La.	1 Twin Coach, 40 pass. 1 American Car & Foundry Motors Corp., 42 pass.	1.37	Nov., 1929	Short feeder from industrial plants in Southport, through residential district to a street car line.	Substituted for street car line. Travel too light on line to operate street cars profitably.	Not in service long enough for a report of operation.
Knoxville Power & Light Company.	Knoxville, Tenn.	4 Versares of the Cincinnati Car Corp., ordered.	To be approximately 5 miles.	To start late in Feb. 1930, or early in March.	City.		

to select trolley buses for the replacement of street cars on one of its lines. Although the line is a feeder, it passes through a heavily populated district, so that the company felt trolley buses would be more efficient and provide satisfactory service. Eight Twin Coaches were purchased for use on the 2.96-mile route.

As mentioned previously, the Utah Light & Traction Company placed ten Versare electric coaches in service on a 3.45-mile route in Salt Lake City on Sept. 9, 1928. The necessity of reconstructing and repaving 4 miles of track led to the investigation of the new type of vehicle. It was felt by the management that the electric coach would be the most economical type to use, and that it would also offer attractive, comfortable and speedy service. Operating costs were very low on the new line, and both the company and public were well pleased. As a result, a second line, 4.74 miles in length, was started on Dec. 4, 1929.

Like the first line, this second one serves a well built up residential district and reaches the central business district of the city. Fourteen new vehicles were ordered for the extension, seven Versares of the Cincinnati Car Corporation and seven Twin Coaches. In addition to the ten original coaches the company secured one more Versare and a Twin Coach in 1928, making a total of 12 in operation at the end of 1928 and 26 at the end of 1929.

The line established in November, 1929, by the New Orleans Public Service, Inc., is a short feeder, 1.37 miles in length, connecting several industrial plants with a street car line. Two vehicles were purchased for this service, one a Twin Coach and the other an A.C.F. The vehicles are being operated partly as an experiment, and more may be placed on lines which do not have sufficient patronage to warrant a street car line.

Late in February, 1930, or early in March, the Knoxville Power & Light Company will place four electric coaches in service on a line approximately 5 miles in length. Full details of this installation are not yet available.

Most Abandonments Caused by Poorly Designed Equipment

During the years 1921, 1922 and 1923 eight installations of trackless trolleys were made in the United States and Canada. Of this number only three are still in existence. The cities in which the operations were abandoned were New York, N. Y.; Toronto, Ont.; Minneapolis, Minn.; Windsor, Ont., and Petersburg, Va. Abandonment of earlier installations occurred in Greenwich, Conn., many years ago; in Laurel Canyon, near Los Angeles, Cal., in 1910; and in Merrill, Wis., in 1913. Little information is known about the Greenwich, Conn., installation, which, it is reported, was operated before any electric street cars made their appearance. Likewise, no definite information is available concerning the installation in Laurel Canyon in 1910. Details of all the other abandonments are known, however, and are presented in an accompanying table. It will be noted from the table that in almost every case the operations

Abandoned Trackless Trolley Operations in the U. S. and Canada

Company	City	Date Started	Type of Service	Equipment	Date Abandoned	Reasons for Abandonment	Service Substituted
.....	Greenwich, Conn.	Before trolleys were operated					
Pacific Electric Railway...	Laurel Canyon, near Los Angeles, Cal.	1910					
Merrill Railway & Light Company.....	Merrill, Wis.	Jan., 1913	City. Reached a ward on west side of city over a bridge, too light and narrow to support a street car line.	One vehicle with a 500-volt motor. Was sold to West End Street Railway, Boston.	Dec., 1913	Proved a failure.	
WestEnd Street Railway..	Sconticut Neck, Mass.	1916		One vehicle purchased from Merrill Railway & Light Co.	1916		
Staten Island - Midland Railway. Operated by Department of Plant and Structures, City of New York.....	Staten Island, New York, N. Y.	Oct. 8, 1921 System expanded Nov. 4, 1922	Feeders. The two original lines extended from the end of a Richmond trolley line. One, 2.6 miles long, reached a large city hospital, the second, 4.4 miles long, served a settlement called Linoleumville. Third line started in Nov., 1922, extended to Tottenville, a distance of 9 miles.	First installed 8 trolley buses by the Atlas Truck Company with G. E. equipment. 15 Brockways bought for third route.	July 31, 1927	Excessive operating costs. Worn-out equipment. Power company shut off power supply because of large debt.	Buses
Toronto Transportation Commission.....	Toronto, Ont.	Fall, 1921	City	Four	Fall, 1923	Were operated under adverse conditions and were purely experimental.	Buses
Twin City Rapid Transit Company.....	Minneapolis, Minn.	Apr. 15, 1922	City	1 Brill; 1 built by Company.	April, 1923	Operating costs excessive. Trouble with trolley poles and control, due to jarring. Residents objected to overhead. Accidents high. Restricted to fixed route.	
Hydro-Electric Railways...	Windsor, Ont.	May, 1922	City	Four	One line, Sept., 1923. Second, May, 1926	First because of track extension. Second, because of inflexibility.	Street cars on first. Buses on second.
Virginia Electric & Power Company. Installation by Virginia Railway & Power Company, its predecessor.....	Petersburg, Va.	June, 1923 Expanded late in 1924	Original line a feeder of 0.8 mile from a residential section to a trolley line. Later extended to business section, replacing street car line. Length 3.5 miles.	Total of five. Two for original installation.	Dec. 31, 1926	Had to pay for and operate on narrow strip of concrete in center of street. Vehicles uncomfortable. Overhead objectionable to residents and expensive to maintain. Operating costs high.	Buses

were suspended because of unsatisfactory performance of the equipment. The rapid development of the bus also was responsible for the replacement of some of these lines.

What can probably be called the pioneer trackless trolley installation in the United States and Canada was that of the Merrill Railway & Light Company, Merrill, Wis. E. S. King, president and general manager of the company, had seen a storage battery operated bus of a large department store in Chicago, and conceived the idea of building a similar bus equipped with a 500-volt motor and trolley poles, to serve a ward of the city which required transportation service. This ward was located on the west banks of the Wisconsin River and could not be reached by street car because the bridge joining this section with the main part of the city was too narrow and not strong enough to support heavy equipment. Mr. King planned to extend his trackless trolley operation if it proved successful, but abandoned the line after maintaining service during the year 1913. The vehicle was purchased by the West End Street Railway of Boston, and operated by this company for a short period at Sconticut Neck, Mass.

With much ceremony, the city of New York introduced trackless trolley transportation to the residents of two sections of Staten Island, on Oct. 8, 1921. Two lines were established, both feeding a trolley line. A total of eight trolley buses was used in this service over the 7 miles of route. On Nov. 4, 1922, the city added a third line on Staten Island, extending a distance of 9 miles and using fifteen trolley buses. Operation on all three lines was suspended on July 31, 1927, when the power company cut off its supply to the city, because of a large unpaid debt for energy consumed. The vehicles, however, were worn out and operating costs were so excessive that the city had been negotiating for some time previous for the substitution of buses.

Details of the systems established by the Toronto Transportation Commission, the Twin City Rapid Transit Company, the Hydro-Electric Railways at Windsor and the Virginia Railway & Power Company are given in the accompanying table of abandonments. Unsatisfactory equipment was responsible for most of these failures.

Many Experiments in Early Years

Tests were made by the Virginia Railway & Power Company in June, 1921, of a trolley bus manufactured by the Atlas Truck Company, with General Electric equipment, over a 1-mile route in Richmond. Later in the year the same company experimented with a trolley bus in a residential district of Norfolk. Detroit was the scene of two tests in 1921, one of a trackless trolley with a Brill body, a Packard chassis and Westinghouse equipment, and the other of St. Louis Car Company manufacture. Tests of equipment also were made in the year by the J. G. Brill Company at Philadelphia, the General Electric Company at Schenectady and the St. Louis Car Company at St. Louis. Later, experiments were made in Los Angeles in 1922, in Norfolk during July, 1923, and at Detroit in the summer of 1924. In Norfolk a Brill trackless trolley was run free to demonstrate its practicability. The Detroit tests were to compare two different types of vehicles, one a Brill, with one General Electric motor, and the other a St. Louis Car Company vehicle, with two Westinghouse motors.

It is interesting to note, through the period of these several experiments and installations, the many proposals in other cities for the installation of trackless trolleys. A few of these, selected at random, are: Greenville, Tex., April, 1921; Akron, Ohio, July, 1921; Buffalo, N. Y., August, 1921; Detroit, Mich., August, 1921; Seattle, Wash., September, 1921; St. Louis, Mo., September, 1921; Milwaukee, Wis., January, 1922; Orange, Tex., March, 1923; Toledo, Ohio, January, 1924; Detroit, Mich., April, 1924; and Albany, N. Y., September, 1924.

From the history of installations, abandonments, experiments and proposals, herewith recorded, it is not difficult to trace the cycle through which the trackless trolley has passed since its first inception. Casual experiments previous to 1921 led up to a great period of activity in the two years following. Installations made in the years from 1921 to 1923 were not entirely successful in all the cities where installed and the next few years saw a waning of popularity. During 1927, however, radically different designs of vehicles made their appearance and there followed two important installations, one at Manila, P. I., and one at Salt Lake City, Utah. At present, it appears that the trolley bus is entering upon another period of much activity. Seven companies are now operating this type of vehicle, another will begin in February or March of 1930, and a few others are planning installations in the near future. Upon the activities of the year 1930 will depend, possibly, the outcome of this type of vehicle and whether it will form for itself a definite place in the field of transportation.

Significant Figures of Past Year in Electric Railway Industry

Expenditures for new plant and equipment	**$135,470,000**
Expenditures for maintenance materials	**$100,535,000**
Expenditures for maintenance labor	**$121,450,000**
Number of new cars bought	**1,419**
Mileage of track extensions	**161.71**
Mileage of track reconstruction	**700.14**
Number of new buses bought	**1,813**
Miles of bus route extension	**3,825**

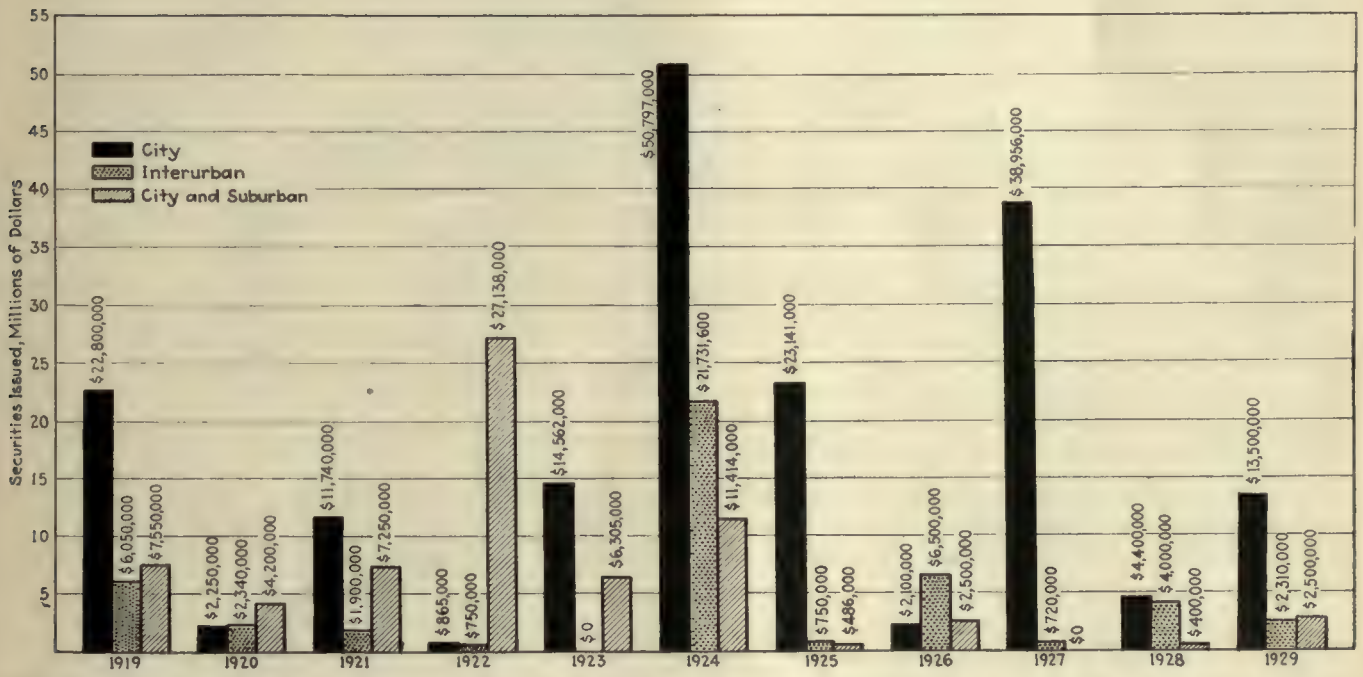
Great Improvement in Financial Situation

With restoration of the industry's credit refunding has been easier in the past year, and maturities are being taken care of on nearly all properties. The receivership status is the most encouraging for any year since the record has been kept by this paper

By

MORRIS BUCK

Engineering Editor *Electric Railway Journal*



The record of financing done by electric railways for the past eleven years shows that the needs of capital are being met adequately

FINANCIALLY speaking, to a greater extent than in any recent year the electric railway industry put its house in order during 1929. Not only was the number of receiverships entered into greatly reduced, but many roads that had been in receivership for a number of years were restored to their owners. Besides this, the total of bonds of electric railway properties in default of interest was reduced almost $40,000,000. Out of a total of $26,668,000 of securities maturing last year, $18,342,000 were retired, and $7,141,000 of bonds, maturing in 22 years or more, were called at prices ranging from 101 to 105. These are the outstanding facts of a record that has not been made by the electric railways for many years, not, in fact, since this paper has been presenting the statistics in its annual reviews.

During the year the major pieces of financing amounted to $18,310,000, as is indicated in Table I. This compares with $8,800,000 in 1928 and $39,676,000 in 1927. By far the largest single transaction in the year was that of the Brooklyn-Manhattan Transit Corporation, which placed an issue of $13,500,000 three-year secured 6½ per cent notes at 98½, or a yield of 7.06 per cent to maturity. The Insull properties placed two issues, one for the South Shore Line and one for the North Shore Line. The South Shore securities were $810,000 of 5½ per cent equipment trust certificates, and the North Shore were $1,500,000 of three-year 6 per cent notes. The latter were placed at 97¾ to yield 6.84 per cent. The other large issue was that of the United Railways & Electric Company of Baltimore. It was divided into two parts, the first being $1,500,000 of first consolidated 4's due in 1949. These bonds, which are part of an issue authorized a number of years ago, were floated at 58. The other issue was $1,000,000 of first and refunding 6½ per cent bonds due in 1957. These were sold at 80. The yields of the two issues were 8.35 per cent and 8.36 per cent respectively.

Table I—Eleven-Year Record of New Electric Railway Financing Involving Bond or Note Issues of More Than $400,000

	City Railway	Interurban	City and Suburban
1919	$22,800,000	$6,050,000	$7,550,000
1920	2,250,000	2,340,000	4,200,000
1921	11,740,000	1,900,000	7,250,000
1922	865,000	750,000	27,138,000
1923	14,562,000		6,305,000
1924	50,797,000	21,731,600	11,414,000
1925	23,141,000	750,000	486,000
1926	2,100,000	6,500,000	2,500,000
1927	38,956,000	720,000	0
1928	4,400,000	4,000,000	400,000
1929	13,500,000	2,310,000	2,500,000

Table II—Comparison of Maturities in the Electric Railway Field

1930	$49,274,000	1925	$28,224,000
1929	27,316,600	1924	73,051,600
1928	47,577,200	1923	94,851,800
1927	180,798,000	1922	160,015,860
1926	26,644,790	1921	207,617,530
		1920	80,466,100

They attracted considerable attention at the time they were issued on account of being part of a mortgage authorized a number of years ago, and on account of the ease with which they were absorbed by investors.

The major portion of the financing during the past year was for city railways, principally on account of the inclusion of the Brooklyn issue. On the other hand, the interurban and combination city and suburban properties handled issues totaling approximately the average in these classifications for the past five years. This shows that it still is possible to obtain funds for the two latter classes of properties if the security is good.

In the present year the maturities will be almost double what they were during 1929. The total for 1930 as given in the table is $49,274,000, as compared with $27,316,000. With the improving position of the electric railways in the eyes of the investing public little difficulty should be involved in the refunding. No very large individual amounts are included, the largest items being the Louisville Railway consolidated 5's, $6,000,000, due in July; Newark Passenger Railway consolidated 5's, $5,849,000, also due in July, and Portland Railway, of Portland, Ore., refunding 5's, $5,870,000, due in November.

Table IV—Principal Electric Railway Maturities in 1930

(Based on Dow, Jones & Company Compilation)

	Security	Rate	Amount
January			**$2,079,000**
Syracuse Rapid Transit Co.	2nd	5	654,000
Topeka Railway	1st	5	622,000
Albany Railway	Cons.	5	428,000
Brooklyn City Railroad	Eq.Tr.A	5	375,000
February			**$3,937,500**
Chicago, North Shore & Milwaukee R.R.	3-Yr.	5½	2,500,000
Hammond, Whiting & East Chicago Ry.	1st	5	1,000,000
Philadelphia Rapid Transit Co.	Eq.Tr.G	5½	237,500
Pittsburgh Railways	Eq.Tr.	6	200,000
March			**$2,900,000**
United Railways & Electric Co. of Baltimore	3-Yr.	6	2,500,000
Berkshire Street Railway	Deb.	5	200,000
Empire Passenger Railway	1st	3½	200,000
April			**$2,179,000**
Rochester Railway	Cons.	5	2,179,000
May			**$3,332,000**
Duluth Street Railway	1st	5	2,500,000
Duluth Street Railway	Gen.	5	832,000
June			**$2,770,000**
City & Suburban Railway	1st	4	1,290,000
Detroit United Railway	Serial	6	500,000
Doylestown & Willow Grove Railway	1st	4	500,000
Pasadena & Mt. Lowe Railway	1st	4	480,000
July			**$15,641,000**
Louisville Railway	Cons.	5	6,000,000
Newark Passenger Railway	Cons.	5	5,849,000
West End Street Railway	Deb.	4½	1,604,000
Duquesne Traction Company	1st	5	1,313,000
West Liberty Street Railway	1st	5	400,000
Allentown & Kutztown Traction Co.	1st	5	250,000
Atlanta Street Railroad	1st	6	225,000
August			**$5,542,500**
Worcester Consolidated Street Railway	Ref.	6½	2,116,000
Worcester Consolidated Street Railway	Ref.	4½	1,489,000
Worcester Consolidated Street Railway	Deb.	6	1,200,000
Worcester & Southbridge Street Railway	1st	6	500,000
Philadelphia Rapid Transit Company	Eq.Tr.G	5½	237,500
September			**$2,493,000**
Hartford Street Railway	1st	4	2,493,000
October			**$1,346,000**
Pittsburgh, Allegheny & Manchester Traction Co.	1st	5	1,346,000
November			**$6,284,000**
Portland (Ore.) Railway	Ref.	5	5,870,000
Sioux Falls Traction Company	1st	6	414,000
December			**$770,000**
Detroit United Railway	Serial	6	500,000
Philadelphia Rapid Transit Company	Eq.Tr.H	5½	270,000
Total for 1930			**$49,274,000**

In the matter of securities defaulted, the year has shown a remarkable improvement. At the beginning of 1929 the total of such securities was $262,953,875. At the close of the year there were only $223,672,275 of

Table III—Disposition of Electric Railway Maturities in 1929

Company and Issue	Amount	Disposition
January	**$1,449,000**	
Interborough Rapid Transit Co. ctfs.	$450,000	Retired
New Bedford, Middleboro & Brockton St. Ry. 1st	324,000	Retired
Eastern Massachusetts St. Ry. refunding	300,000	Retired
Brooklyn City Railroad equipment trust	375,000	Retired
February	**$768,500**	
South Shore & Boston St. Ry., 1st	$331,000	Retired
Philadelphia Rapid Transit Co., equip. trust G	237,500	Retired
Pittsburgh Railways, equipment trust	200,000	No data
May	**$328,000**	
Marion City Railway, 1st	$328,000	None
June	**$250,000**	
East Side Traction Co., 1st	$250,000	Retired
July	**$1,398,000**	
Lebanon Valley St. Railway, 1st	$500,000	None
Erie Traction Co., 1st	353,000	Retired
Central Traction Co., 1st	325,000	Extended
LaCrosse City Railway, 1st	220,000	Refunded
August	**$11,028,500**	
Atlantic & Suburban Railway, 1st	$591,100	No data
Philadelphia Rapid Transit Co., equipment trust G	237,500	Retired
Aroostook Valley Railroad, 1st	200,000	Retired
Brooklyn-Manhattan Transit Co., 1 yr.	10,000,000	Retired
September	**$2,714,000**	
Wilkinsburgh & East Pittsburgh Ry., 1st	$1,989,000	Extended
Terre Haute, Indianapolis & Eastern Traction Co., clt.	425,000	Retired
Hoosac Valley Street Railway, refunding	300,000	Extended
November	**$3,570,000**	
Baltimore Traction Co., 1st	$1,500,000	Retired
Pittsburgh & Birmingham Traction Co., 1st	1,500,000	Extended
Interborough Rapid Transit Co., ctfs. C	570,000	Retired
December	**$5,152,050**	
Lynn & Boston Railroad, 1st	$2,519,000	Retired
St. Louis Electric Terminal Railway, 1st	1,724,000	Extended
Johnstown Passenger Railway, consolidated	399,000	Renewed
East McKeesport Street Railway, 1st	250,000	Extended
Philadelphia Rapid Transit Co., equipment trust H	270,000	Retired

Summary of Dispositions by Months

Month	Retired	Refunded	Extended	No Disposition	Unknown
January	$1,449,000				
February	568,500				$200,000
March					
April					
May				$328,000	
June	250,000				
July	353,000	$220,000	$325,000	500,000	
August	10,437,500				591,100
September	425,000		2,289,000		
October					
November	2,070,000		1,500,000		
December	2,789,000		2,373,000		
Total	$18,342,000	$220,000	$6,487,000	$828,000	$791,100
	Grand total			$26,668,000	

Table V—New Bond and Note Financing in 1929 Offered Publicly in Amounts of More Than $250,000

Issue	Price	Maturity	Yield	Amount
Chicago, South Shore & South Bend R.R. Equipment Trust C 5½'s		1930–39		$810,000
Brooklyn-Manhattan Transit Corporation 3-yr. secured notes, 6½'s	98.50	1932	7.06	13,500,000
Chicago, North Shore & Milwaukee R.R. 3-yr. notes, 6's	97.75	1932	6.84	1,500,000
United Railways & Electric Co. of Baltimore 1st consolidated 4's	58.00	1949	8.35	1,500,000
United Railways & Electric Co. of Baltimore 1st and refunding 6½'s	80.00	1957	8.36	1,000,000
Total				$18,310,000

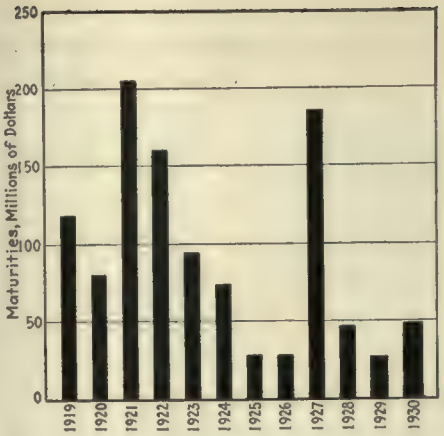
Table VI—Electric Railway Securities Called in 1929

Month	Company	Mature	Amount	Price
February	Wilmington & Philadelphia Traction Co. 5's	1963	$5,041,000	105
March	Cleveland, Elyria & Western Ry. 6's	1954	1,073,000	101
March	Wilmington City Ry. 1st 5's	1951	600,000	105
March	Cleveland & Elyria Div. 6's	1954	200,000	101
March	Cleveland, Berea, Elyria & Oberlin 6's	1954	127,000	101
March	Cleveland & Oberlin Div. 6's	1954	100,000	101

Table VII—Electric Railway Receiverships—1929

	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver's Certificates
Hammond, Whiting & East Chicago Ry., Hammond, Ind.	34.16	$1,000,000	$1,788,000	None
New York State Railways, Rochester, N. Y.	254.14	23,814,900	26,087,000	None
United Traction Co., Albany, N. Y.	112.10	12,500,000	6,500,000	None
Oklahoma Union Railway, Tulsa, Okla.	18.9	$1,500,000	$750,000	None
Sunbury & Selinsgrove Railway, Selinsgrove, Pa.	6.2	220,100	13,400	None
Total for 1929	425.50	$39,035,000	$35,138,400	None

bonds in default. The situation is the more encouraging when it is seen that included in these totals are items of $156,169,475 of bonds of the Chicago Surface Lines constituent companies, defaulted on account of the unsatisfactory political situation which prevented a renewal of the operating franchises early in 1927. As a result it was not possible to refinance and the bonds are technically in default, although interest is being paid regularly on them, and the principal undoubtedly will be paid off or refunded as soon as an agreement with the city is reached. Apart from these securities the total of defaulted bonds a year ago was $106,784,400. At the end of the year just closed the amount had been reduced to $67,602,800. In other words, more than a third of the issues in default, except for Chicago, had been adjusted. This excellent record speaks well for the soundness of the industry.

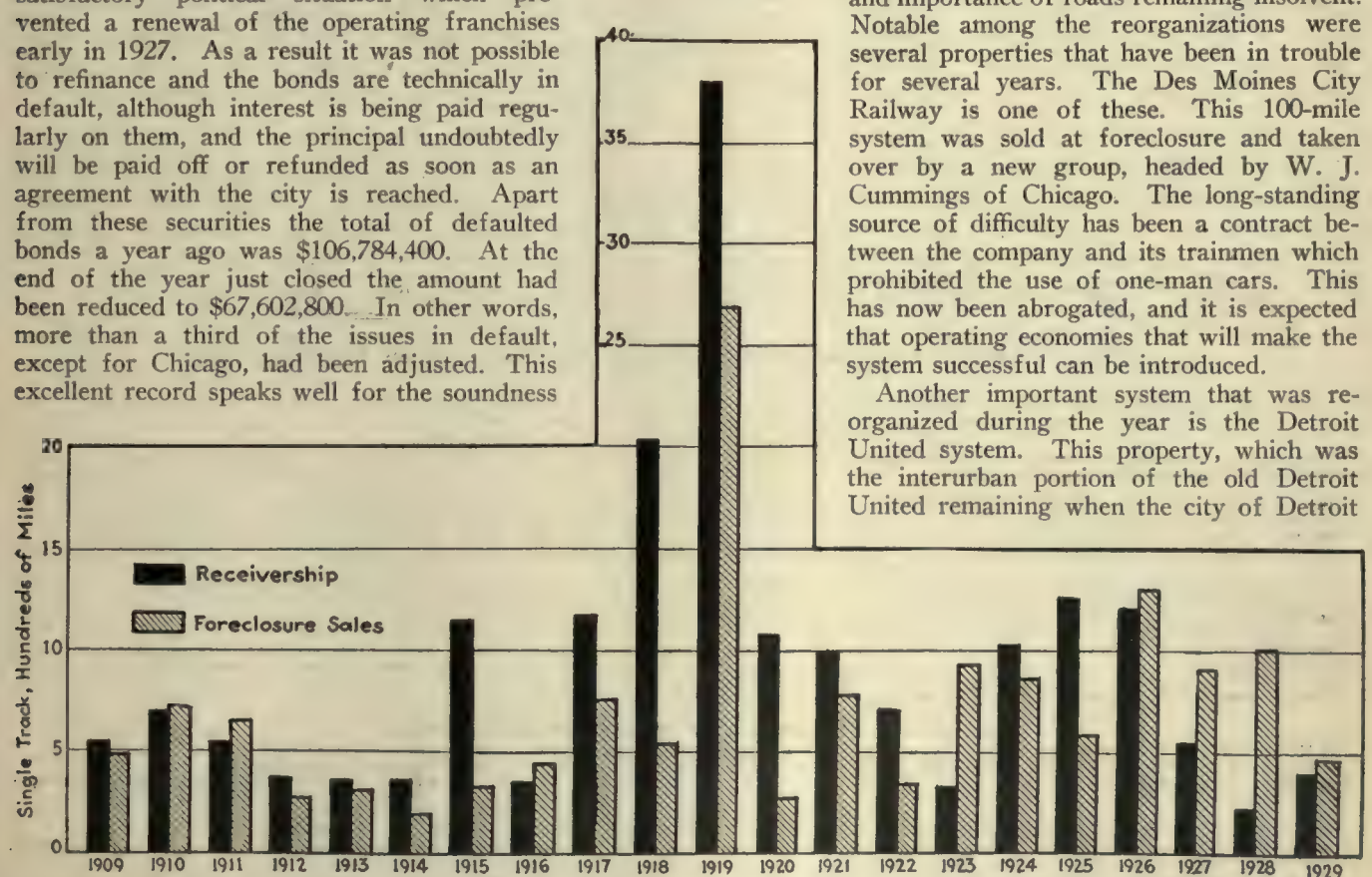


Maturities for 1930 show an increase above last year, but are relatively small in the aggregate

The receivership record of 1929 would be good at any time, but is particularly noteworthy after the record of the past twenty years. When conditions in the industry were normal, in the five years before the World War began, the receiverships averaged nineteen per year, with an average of 500 miles of track each year, and with securities averaging $24,700,000 in stock and $39,000,000 in bonds. As the war progressed the situation became worse, the 1919 record reaching the tremendous figure of 48 roads with 3,781 miles of track thrown into receivership, involving $321,000,000 of stocks and $312,900,000 of bonds. From that point the receiverships diminished gradually until only eight roads became involved in 1928. But the record for last year, when only five roads with a total of 510 miles of track, and with $18,473,000 of stocks and $21,173,700 of bonds went into the hands of receivers, is the best since 1925. It is also noteworthy that one of these roads was able to satisfy its creditors and the arrangements for ending the receivership were made during the year.

There also has been a material reduction in the number and importance of roads remaining insolvent. Notable among the reorganizations were several properties that have been in trouble for several years. The Des Moines City Railway is one of these. This 100-mile system was sold at foreclosure and taken over by a new group, headed by W. J. Cummings of Chicago. The long-standing source of difficulty has been a contract between the company and its trainmen which prohibited the use of one-man cars. This has now been abrogated, and it is expected that operating economies that will make the system successful can be introduced.

Another important system that was reorganized during the year is the Detroit United system. This property, which was the interurban portion of the old Detroit United remaining when the city of Detroit



The great improvement in the receivership situation is seen from this record covering the past 21 years

Table VIII—Outstanding Electric Railway Bonds in Default of Interest

(Based on Compilation by Dow, Jones & Company)

	Amount	Defaulted
Auburn & Syracuse Electric R.R. ref. 5's	$1,752,000	April, 1926
Bethlehem & Nazareth Railway 5's, 1929	150,000	May, 1929
Bloomfield Street Railway 5's, 1923	250,000	Aug., 1923
Brownsville Avenue Street Railway 5's, 1926	300,000	Aug., 1926
Buffalo & Erie Railway 1st 6½'s	994,000	July, 1925
Buffalo & Lackawanna Traction Company 5's, 1928	1,000,000	Dec., 1918
Calumet & South Chicago Railway 5's, 1927	5,532,000	Feb., 1927
Central Passenger Railway 6's, 1924	125,000	Oct., 1924
Chatham, Wallaceburg & Lake Erie 6's, 1925	800,000	July, 1925
Chicago City & Connecting Railways 5's, 1927	20,616,000	Jan., 1927
Chicago City Railway 1st 5's, 1927	33,926,000	Feb., 1927
Chicago Railways 1st 5's, 1927	55,655,000	Feb., 1927
Cons. A 5's, 1927	16,703,800	Feb., 1927
Cons. B 5's, 1927	17,164,475	Feb., 1927
Purch. money 5's, 1927	4,073,000	Feb., 1927
Adj. income 4's, 1927	2,500,000	Feb., 1927
Citizens Traction Company 1st 5's, 1927	246,000	Oct., 1927
Clinton Street Railway 1st 5's, 1926	400,000	April, 1926
Detroit, Jackson & Chicago Railway 5's	881,000	Aug., 1925
Evansville & Ohio Valley Railway 5's	1,034,200	Jan., 1928
Inter-Urban Railway 1st 7½'s	562,500	April, 1927
Inter-Urban debenture 6's	250,000	Jan., 1923
Kansas-Oklahoma Traction Company 6's	234,000	Nov., 1924
Key System Securities Company coll. 6's	2,500,000	July, 1929
Lakeside Railway 1st 6's	150,000	Nov., 1927
Lebanon Valley Street Railway 5's, 1929	500,000	July, 1929
Lowell & Fitchburg Street Railway 5's, 1926	275,000	Jan., 1926
Millvale, Etna & Sharon Street Railway 5's, 1923	741,000	Nov., 1923
Monongahela Street Railway 5's, 1928	993,000	June, 1928
New York & Queens County Railway 4's	1,300,000	April, 1922
New York State Railways cons. A 4½'s	13,457,000	Nov., 1929
New York State Railways cons. B 6½'s	3,000,000	Nov., 1929
Ogdensburg Street Railway 6's, 1925	150,000	Sept., 1925
Penn Street Railway 1st 5's, 1922	250,000	June, 1922
Pittsburgh & Birmingham Traction Co. 5's, 1929	1,500,000	Nov., 1929
Pittsburgh, Crafton & Mansfield 5's, 1924	171,000	July, 1924
Pittsburgh Traction Company 5's 1927	666,000	Oct., 1927
Pittsburgh & West End Passenger Railway 5's, 1922	313,000	July, 1922
Puget Sound Electric Railway cons. 5's	2,427,000	Aug., 1927
Rochester & Syracuse Railroad 5's	2,448,500	May, 1927
Salt Lake & Utah Railroad 1st 6's	1,431,900	Oct., 1925
Salt Lake & Utah Railroad conv. 7's, 1928	150,000	Oct., 1925
Seattle & Rainier Valley Railway 6's	484,000	Jan., 1928
Seattle & Rainier Valley Railway general 5's	577,500	Jan., 1928
Southwest Missouri Electric Company 6's, 1928	909,000	Sept., 1926
Southwest Missouri Railroad 5's	1,034,000	Sept., 1926
Springfield Railway 1st 5's	1,335,400	March, 1928
Steinway Railway 6's, 1922	1,500,000	July, 1922
Syracuse, Lake Shore & Northern Railroad 5's	2,496,000	May, 1927
Union Traction Company, Coffeyville, Kansas 5's	941,000	Jan., 1925
Union Traction Company of Indiana gen. 6's	4,623,000	Jan., 1925
Washington Electric Street Railway 5's, 1927	125,000	Feb., 1927
Waterloo Cedar Falls & Northern 5's	5,773,000	Jan., 1922
Webb City Northern Electric Railroad 6's, 1928	125,000	Sept., 1926
Wilkes-Barre & Hazelton Railway 1st 5's	1,761,000	May, 1929
Wilkes-Barre & Hazelton 2nd coll. 5's	1,227,000	April, 1929
Wilkinsburg & East Pittsburgh 5's, 1929	1,989,000	Sept., 1929
Youngstown & Ohio River Railroad 1st 5's	1,200,000	April, 1927
Total	$223,672,275	

Table IX—Record of Electric Railway Receiverships

Year	Number of Companies	Miles of Single Track Involved	Outstanding Securities—Stocks	Outstanding Securities—Bonds
1909	22	558.00	$29,962,200	$22,325,000
1910	11	696.61	12,629,400	75,490,735
1911	19	518.90	29,533,450	38,973,293
1912	26	373.58	20,410,700	11,133,800
1913	18	342.84	31,006,900	47,272,200
1914	10	362.39	35,562,550	19,050,460
1915	27	1,152.10	40,298,050	39,372,375
1916	15	359.26	14,476,600	10,849,200
1917	21	1,177.32	33,918,725	33,778,400
1918	29	2,017.61	92,130,388	163,257,102
1919	48	3,781.12	321,259,354	312,915,104
1920	19	1,065.31	28,758,455	72,283,575
1921	19	986.42	32,909,525	36,177,800
1922	14	695.43	18,140,150	20,304,400
1923	12	333.63	8,332,100	14,707,066
1924	12	1,021.88	28,489,700	35,716,000
1925	14	1,260.07	51,383,195	54,696,525
1926	16	1,228.28	17,769,435	117,560,073
1927	13	624.32	17,615,050	20,875,450
1928	8	261.95	9,216,700	14,790,700
1929	5	425.50	39,035,000	35,138,400

Table X—Record of Electric Railway Foreclosure Sales

Year	Number of Companies	Miles of Track Involved	Outstanding Securities—Stocks	Outstanding Securities—Bonds	Outstanding Securities—Receivers' Certificates
1909	21	488.00	$22,265,700	$21,174,000	(a)
1910	22	724.36	19,106,613	26,374,075	(a)
1911	25	660.72	91,354,800	115,092,750	(a)
1912	18	267.18	14,197,300	10,685,250	(a)
1913	17	302.28	15,243,700	19,094,500	(a)
1914	11	181.26	26,239,700	44,094,241	(a)
1915	19	308.31	30,508,817	16,759,997	(a)
1916	19	430.14	13,895,400	22,702,300	(a)
1917	26	745.19	27,281,900	27,313,045	(a)
1918	23	524.22	37,740,325	20,149,384	(a)
1919	29	2,675.48	89,893,400	79,836,738	$42,300
1920	13	259.90	7,782,400	11,227,328	52,000
1921	13	777.97	33,642,255	30,863,526	5,000
1922	13	322.88	7,491,500	12,640,600	14,683
1923	15	927.45	118,077,959	110,638,250	12,265,000
1924	14	869.25	21,022,800	34,845,535	3,440,388
1925	13	569.39	18,074,300	18,329,555	53,000
1926	28	1,291.17	20,054,700	57,340,363	214,000
1927	16	940.68	53,345,000	78,445,100	3,140,000
1928	8	1,003.73	26,084,325	40,683,400	168,150
1929	10	510.38	18,472,995	21,173,700	285,359

(a) Data not available.

purchased the city lines, finally was able to work out a plan for satisfying its creditors. It now has been reorganized as the Eastern Michigan Railways. Incidentally, this was the largest road remaining in receivership at the beginning of last year, comprising 613.9 miles of track and involving $45,000,000 of securities.

The Indiana, Columbus & Eastern Traction Company, which went into receivership in 1921, finally adjusted its difficulties and was merged with the Cincinnati, Hamilton & Dayton Railway. The plan was worked out in 1928, but was not consummated until last year.

With these roads and a number of others out of

Table XI—Receiverships Terminated and Foreclosure Sales During 1929

Receivers Discharged with or without Foreclosure Sales or Following Abandonment	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver's Certificates	
Indianapolis & Cincinnati Traction Co., Indianapolis, Ind.	101.00	$3,600,000	$2,600,000	156,000	Sold at receiver's sale in 1928. Receiver disharged.
Milford & Uxbridge Street Ry., Milford, Mass.	35.00	540,000	500,000	None	Sold at foreclosure in 1927. Receiver discharged March, 1929.
Wahpeton-Breckenridge Street Ry., Breckenridge, Minn.	1.00	42,500	None	None	Receivership lifted.
Atlantic & Suburban Ry., Atlantic City, N. J.	16.00	150,000	691,000	None	Sold at foreclosure. Road sold for scrap.
Missouri & Kansas Ry., Kansas City, Kansas	20.03	1,000,000	655,000	None	Sold at foreclosure and receiver discharged.
Joplin & Pittsburgh Ry., Pittsburgh, Kansas	94.52	7,000,000	3,078,500	None	Sold at foreclosure; now operated by Joplin & Pittsburgh R. R.
Manhattan & Queens Traction Corp., Long Island City, N. Y.	20.11	20,000	None	None	Reorganized and receiver discharged.
Ogdensburg Street Ry., Odgensburg, N. Y.	4.23	150,000	150,000	None	Receivership lifted April 13, 1929.
Westchester Street R. R., New York, N. Y.	17.68	700,000	168,000	None	Sold at foreclosure in 1927 and receivership lfited September, 1929
Tulsa Street Ry., Tulsa, Okla.	23.00	800,000	None	None	Sold at foreclosure, and reorganized as the United Service Company. Receiver discharged.
Total of receiverships terminated (nine companies)	332.57	$14,002,500	$7,842,500	156,000	
Sold at Foreclosure Sale But Receiver Not Yet Discharged					
Des Moines City Ry., Des Moines, Iowa	103.10	$3,019,100	$4,821,000	None	Sold at receiver's sale.
Hammond, Whiting and East Chicago Ry., Hammond, Ind.	34.16	1,000,000	1,788,000	None	Sold at foreclosure sale.
Binghamton Ry., Binghamton, N. Y.	47.31	978,895	2,877,200	None	Sold at foreclosure and reorganized as the Triple Cities Traction Company.
Ithaca Traction Corp., Ithaca, N. Y.	12.72	400,000	763,000	25,000	Sold at receiver's sale.
Indiana, Columbus & Eastern Traction Co., Springfield, Ohio	153.23	4,025,000	6,400,000	260,359	Sold at receiver's sale.
Lawton Railway & Light Co., Lawton, Okla.	6.31	100,000	100,000	None	Sold at receiver's sale and company out of existence.
Total foreclosure sales, receiver not discharged (six companies)	356.83	$9,522,995	$16,749,200	285,359	

receivership, the record has been greatly improved. Apart from the New York State properties, which were taken over by the courts on Dec. 30, the only system of any size remaining in receivership is the Union Traction Company of Indiana. With 445.5 miles of track and $27,300,000 of securities involved, it represents a large item in the total of receiverships at the end of the year. Various plans have been proposed for its reorganization, but up to date none of them has been accepted.

One of the most searching analyses of an industry ever made was that conducted recently for the Investment Bankers Association by its public service securities committee, and just released by the association. In general it believes in the inherent soundness of this class of properties, although it issues a warning against over-inflation of prices of some of the holding companies. On the specific subject of electric railway properties the report in part is as follows:

The street railway industry is laboring to recover its former position of prestige, to which the community benefits it confers entitle it. When the source of income of an industry is not increasing—is, in fact, too frequently decreasing—it cannot raise needed capital advantageously, and the market position of its securities suffers accordingly. Increase in fares and reduction in operating expenses have their limits; and net earnings dependent for their increase on such factors spell sooner or later an unsuccessful business. All this is unfortunate, for the street railway is an indispensable service, especially in large communities. It behooves the owner of street railway securities, and the would-be investor in them, to gage if possible the reasons for the existing situation and the possible remedies for it.

Unless the public is to take over these operations (which your committee believes to be a wrong policy to pursue), and tax the whole community for such service as it elects to give, it must change its attitude toward the street railway and recognize it as a public servant conferring definite and large community benefits, and relieve it of inequitable financing burdens. Why should a street railway pay large paving costs, and snow removal costs, for general public advantage? Why should not subway and similar costs be borne by the benefited property, as are other street improvements, for a subway is nothing but street extension? It is the fair cost of service that the car rider should pay, under careful public regulation, and not a 5-cent fare specified in some antiquated franchise, under which a service essential to public welfare cannot survive. And the public must recognize that monopoly of all the facilities of transportation under public regulation will confer wider community benefits than can a continuation of destructive competition.

On the other hand, the industry has grave responsibilities. A new point of view must be developed, both as to equipment and operating methods. Evolution in these respects has been astonishingly slow. The whole subject must be thought of in new terms. First, income must be increased—more passengers must use street cars. Present equipment is for the most part an anachronism. Cars must be made attractive, light weight, noiseless, easy to board and leave. Public taste and convenience must be catered to. This done, the great advantage of the street car rolling on a fixed track over any form of free-moving bus, in transporting multitudes of people, should make itself apparent. To all of this the American Electric Railway Association is abundantly alive, and at its convention just held in Atlantic City there was much evidence of progress in equipment—new design of cars, differential drive, worm gears and numberless devices to make the street car more attractive to passengers and the public both in appearance and performance. These efforts, the gradual restrictions on parking privileges in congested districts, and the co-ordination of the various transportation services should mean a recovery in the street railway industry.

The significance of the abandonment of track has been overestimated. Most of this has been normal; some, of course, has been forced by competition. Interurban roads particularly have suffered, as was to have been expected when the motor car appeared. Street railways are local urban enterprises and each must be studied and estimated in the light of the peculiar problems surrounding it. In some instances the investment possibilities of the securities of individual properties have not been recognized because of too

Table XII—Electric Railway Receiverships as of Dec. 31, 1929

	Year of Receivership	Miles of Single Track	Capital Stock	Funded Debt	Receiver's Certificates
Illinois					
Chicago Railways, Chicago	1926	597.06	$100,000	$103,854,255	None
Peoria Railway Terminal Co., Peoria (1)	1922	25.28	$1,000,000	2,444,000	None
Indiana					
Chicago, South Bend & Northern Indiana Ry., South Bend	1927	125.00	7,500,000	4,955,500	None
Evansville & Ohio Valley Ry., Evansville	1927	42.85	511,985	1,960,900	None
Hammond, Whiting & East Chicago Ry., Hammond, Ind. (11)	1929	34.16	1,000,000	1,788,000	None
Southern Michigan Railway, South Bend	1928	36.50	2,000,000	1,145,000	None
Union Traction Co. of Indiana, Anderson	1924	451.67	11,500,000	15,848,000	None
Iowa					
Des Moines City Ry., Des Moines (9)	1927	103.10	3,019,100	4,821,000	None
Mississippi Valley Electric Co., Iowa City	1926	6.00	538,420	148,000	None
Kansas					
Union Traction Co., Coffeyville	1927	85.00	700,000	1,150,000	None
Kentucky					
Owensboro City R. R., Owensboro	1923	11.95	75,000	400,000	None
Michigan					
Detroit & Port Huron Shore Line Ry., Detroit (8)	1925	125.00	2,000,000	2,500,000	None
Houghton County Traction Co., Houghton	1921	32.15	957,200	660,000	None
Michigan Railroad, Jackson (2)	1924	156.71	4,000,000	4,050,000	None
Minnesota					
Minneapolis, Anoka & Cuyuna Range Ry., Minneapolis	1926	29.25	300,000	284,000	None
St. Paul Southern Electric Ry., Hastings (7)	1918	17.54	658,225	364,900	12,900
Missouri					
Hannibal Railway & Electric Co., Hannibal	1927	6.50	111,165	102,500	None
Southwest Missouri R. R., Webb City	1926	90.00	5,000,000	2,341,000	None
New York					
Auburn & Northern Electric R. R., Syracuse	1928	(a)	(b)	236,000	None
Binghamton Ry., Binghamton (3)	1925	47.31	978,895	2,877,200	None
Buffalo & Erie Ry., Fredonia	1928	95.56	1,450,500	910,300	None
Buffalo & Lackawanna Traction Co., Buffalo	1918	8.80	55,000	1,000,000	None
Eighth and Ninth Avenues Ry., New York	1927	37.84	116,000*	None	None
Empire State R. R., Syracuse	1927	76.31	2,950,000	2,750,000	None
Hamburg Ry., Buffalo	1920	21.72	None	750,000	4,000
Ithaca Traction Corp., Ithaca (10)	1924	12.72	400,000	763,000	25,000
New York & Queens County Ry., Jackson Heights	1923	34.94	3,235,000	1,300,000	None
New York State Rys., Rochester, N. Y.	1929	254.14	23,814,900	26,087,000	None
Second Avenue R. R., New York (4)	1908	23.96	1,600,000	None	None
Staten Island Midland Ry., Brooklyn	1920	28.68	1,000,000	1,000,000	3,000
Steinway Ry., New York	1922	31.11	None	1,500,000	None
Syracuse, Lake Shore & Northern Ry., Syracuse	1928	(a)	(b)	2,496,000	None
United Traction Co., Albany, N. Y.	1929	112.10	12,500,000	6,500,000	None
Ohio					
Indiana, Columbus & Eastern Traction Co., Springfield (5)	1921	153.25	4,025,000	6,400,000	260,359
Springfield Ry., Springfield	1928	40.54	1,500,000	1,335,400	None
Oklahoma					
Lawton Railway & Light Co., Lawton (6)	1927	6.31	100,000	100,000	None
Oklahoma Union Railway, Tulsa	1929	18.90	1,500,000	750,000	None
Pennsylvania					
Schuylkill Ry., Girardville	1927	34.00	400,000	1,550,000	None
Sunbury & Selinsgrove Ry., Selinsgrove	1929	6.20	220,100	13,400	None
Utah					
Salt Lake & Utah R. R., Salt Lake City	1925	97.55	5,043,700	2,532,320	200,000
Washington					
Puget Sound Electric Ry., Tacoma	1928	57.10	3,116,200	7,322,000	None
Net receiverships Dec. 31, 1929		3,142.61	104,860,390	216,989,675	$505,259

(a) Included with Empire State R. R. figures.
(b) Information not available.
(1) Sold at foreclosure in 1927. Receiver not yet discharged.
(2) Sold at receiver's sale 1928. Receiver not yet discharged.
(3) Sold at foreclosure and reorganized as Triple Cities Traction Co.
(4) Reorganized as Second Avenue Railroad Corp. Receiver not yet discharged.
(5) Sold at receiver's sale. Receiver not yet discharged.
(6) Sold at receiver's sale. Receiver not yet discharged. Company out of existence.
(7) Sold at public auction in 1928. Receiver not yet discharged.
(8) This is the only subsidiary company of the Detroit United Ry. now operating under receivership. The Detroit, Jackson & Chicago Ry. has discontinued service and the Detroit United Ry. and the Detroit, Monroe and Toledo R. R. were sold at foreclosure and reorganized as the Eastern Michigan Rys.
(9) Sold at receiver's sale. Receiver not yet discharged.
(10) Sold at receiver's sale. Now operated by Ithaca Ry. Co., but receiver not yet discharged.
(11) Sold at foreclosure sale. Receiver not yet discharged.
*58,000 shares. No par value. Based on market quotation.

broad generalizations, though what has already been said seems too germane to the industry as a whole to be overlooked.

The aggregate figures of investment and income for the industry are impressive. They show an industry that must survive in the public interest. The new brains in the industry, looking ahead and discarding the past, will accomplish much, and may accomplish a revolution in the business if they be given time and support.

On the other hand, some unfavorable comment has been heard concerning the financial status of the industry. Only recently a spokesman for one of the investment services warned against the purchase of electric railway bonds. His words were widely circulated. They should be taken *cum grano salis,* but they certainly did not help the situation. In an appeal to bondholders of the New York State Railways and other properties for the conversion of their securities, H. C. Hopson, president of the Associated Gas & Electric Company, made a number of statements which are not reassuring to present holders and can have only a bad effect on any prospective purchasers of railway securities. The situation on the properties in New York State has been acute for some time, and culminated in their receivership a few days ago. But to generalize about the railway financial situation as a whole from the status of these companies is entirely unjustified.

As the Investment Bankers Association points out, the street railway is a much more essential service than one might be led to believe if he were to accept at face value all that the adverse commentators have said about it. Too often, far too often, the railways have been made the football of politics. This is Mr. Insull's comment in his recent penetrating remarks about Chicago. Companies with which he is identified have made a financial success not only in interurban operation, but in operation in the more moderate sized cities, the ones in which it is held that successful operation is most difficult. Not even the committee on electric railway financing of the A.E.R.A., which reported several years ago after an extended investigation, sought to mitigate the condition which exists of a need for recasting of financial structures of many properties. It is regrettable that more companies have not followed out these recommendations, but the comments of Mr. Hopson and others may properly be characterized as representing the extreme point of view. It is more nearly true, as Mr. Insull said of the Chicago situation, that with proper set-up of the financial plan, founded on true economic principles, money necessary will pour in from securities, both senior and junior—bonds, preferred and common stock.

Much Construction Work Features Heavy Electric Traction in 1929

CONSTRUCTION work on projects already authorized occupied the major attention of electrification engineers during the year just past. The conversion has continued at a rate foreshadowed by the announcements made public during 1928. While comparatively little track was opened to electric operation during the year, the present year will witness the fulfillment of many of the projects under way.

Chief among the installations being made is that of the Pennsylvania Railroad, which is actively at work on extension of its electric system to cover the territory between New York and Washington. The section between Philadelphia and Wilmington is now using electric power for local service over 52.6 miles of route. The sections comprising the line between Philadelphia and New York will follow next. The obstacle to electrification of the line between Wilmington and Washington, the series of tunnels in Baltimore, has now been removed by the action of the city to permit the construction of new tunnels to supplement the present ones. In all a total of 325 miles of route and 1,300 miles of track has been authorized. Following the completion of the New York-Washington line, it is rumored that the Pennsylvania will proceed at once with preparations for the electrification of the route over the Allegheny Mountains between Philadelphia and Pittsburgh, a project which has been considered for years.

The Cleveland Union Terminal Company has virtually completed the equipment of the new terminal at the Public Square in Cleveland and the approaches of the several roads entering it, so that electric operation will begin in the immediate future.

The Delaware, Lackawanna & Western Railroad is making rapid progress with the conversion of its suburban lines out of New York for electric service. The construction is well under way and the equipment is on order. The work probably will be completed during the present year.

The Reading Company is proceding with plans for the electrification of its Philadelphia terminal and the suburban lines running out of it. The authorization was made late in 1928, and construction work is just beginning.

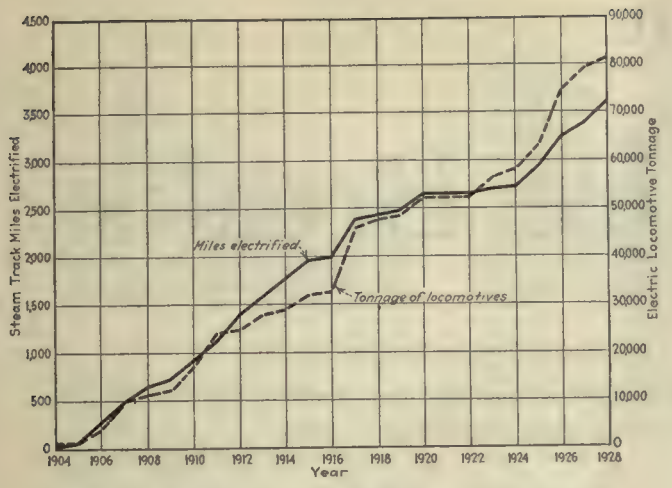
Steam Railroad Electrification Reported for 1929

	Miles of Track
Cleveland, Cincinnati, Chicago & St. Louis Railroad, Cleveland	4.25
Cleveland Union Terminals Company, Cleveland	4.01
Illinois Central Railroad, Chicago and vicinity	25.88
Long Island Railroad, New York and vicinity	9.23
New York Central Railroad, Cleveland	3.51
New York Central Railroad, New York and vicinity	2.46
New York, Chicago & St. Louis Railroad, Cleveland	5.32
New York, New Haven & Hartford Railroad, New York and vic'ty	1.59
Pennsylvania Railroad, Philadelphia-Wilmington	150.06
Virginian Railway, Roanoke, Va.-Mullens, W. Va.	0.13

While the construction work was completed in 1928, electric operation of the new tunnel of the Great Northern Railway through the Cascade Mountains was opened in January of last year. This replaces the former short electrification of the old tunnel, and brings the electrified track on this system up to 87.5 miles.

During the year extensions to the Illinois Central electric zone in Chicago were made totaling 25.88 miles. This road also ordered four electric locomotives for freight switching in the Chicago terminal division. Figures for extensions to electrified track are given in one of the tables.

Among the new projects which have been discussed during the past year the outstanding one is that of the New York Central. Plans have been prepared in some



Mileage of Steam Railroads Electrified and Total Weight of Active Electric Locomotives in Tons

As reported by Committee on Heavy Electric Traction, A.E.R.E.A.

detail for the electrification of the system between New York and Buffalo. This is a section of dense traffic which ultimately, it is said, will have to be powered with some form of energy other than steam. No definite announcements have been made, but it is understood that the work as planned will cost in the neighborhood of $150,000,000.

The Lehigh Valley Railroad has received bids from the leading electrical manufacturers on the equipment of 75 miles of route of its main line between Mauch Chunk and Wilkes-Barre, Pa. The cost of this project would be between $7,000,000 and $10,000,000, and would assist traffic on the ruling grades of the system. The section is through mountainous territory, and the use of electricity would make possible the movement of more and longer trains at greater speed than is possible with steam.

In foreign countries the progress in electrification is in line with that in this country. The Central Argentine Railway was authorized in 1929 to proceed with the extension of its suburban electrification out of Buenos Aires. The new project involves a total of 26 miles. The Central Terminal Railway of Buenos Aires is constructing 5½ miles of double-track subway into the main business district of the city, with the intention of operating its passenger trains to a new terminal to be built in the business district.

The New South Wales Government Railway is converting to electric traction its suburban services at Sydney. It is expected that the project, involving about 400 track-miles, will be completed this year.

Work is in progress on the electrification of the divisions of the Great Indian Peninsula Railway between Kalyan and Poona and Igatpuri. With the main line from Bombay to Kalyan already completed, the total electrification will comprise about 180 miles of route.

Electrifications are also planned in the Netherlands, Sweden, Germany, Italy, France and Spain. In England and Austria plans have been deferred for economic reasons. The principal Swiss railways already have been converted to electric operation, and comparatively few lines demand a change to electric power at present.

Installations of Electrical Operation of Steam Railroads in the United States

Based on original data, supplemented by reports of the American Electric Railway Engineering Association and the National Electric Light Association

Railroad—Location	Electric Mileage		System			Year Electrified	Electric Locomotives		Motor Cars	Daily Trains		Annual Car-Miles	
	Route	Track	Volts	Cycles	Contact Line		Pass.	Freight		Pass.	Freight	Pass.	Freight
Baltimore & Ohio—Baltimore, Md.	3.6	9.1	675	d.c.	Rail	1895	12	a	0	13	21	142,590	1,297,900
Boston & Maine—Hoosac Tunnel, Mass.	7.9	21.4	11,000	25	Over'd	1911	a	7	0	12	28	215,172	3,868,065
Butte, Anaconda & Pacific—Butte-Anaconda-Rocker, Mont.	37.4	145.8	2,400	d.c.	Over'd	1913	1	27	0	4	6	117,457	5,079,040
Chicago, Milwaukee, St. Paul & Pacific—Harlowton, Mont.-Avery, Idaho	440.1	578.0	3,000	d.c.	Over'd	1916	9	27	0	4		6,553,898	52,190,990
Othello-Tacoma-Seattle, Wash.	218.4	305.4	3,000	d.c.	Over'd	1920	5	15	0	4		3,810,520	15,810,893
Great Falls, Mont. (Yard)	0.0	6.9	1,500	d.c.	Over'd	1915							
Gallatin Valley Branch	18.8	24.8	600	d.c.	Over'd			1	1				
Cleveland Union Terminal—Cleveland, Ohio	18.8	40.0	3,000	d.c.	Over'd	a	22	0	0				
Delaware, Lackawanna & Western—Hoboken-Dover-Gladstone, N. J.	70.0	160.0	3,000	d.c.	Over'd	b			141				
Detroit, Toledo & Ironton—Fordson-Flat Rock, Mich.	16.6	50.0	22,000	25	Over'd	1926	0	2	0	0	8		
Erie—Rochester-Mt. Morris, N. Y.	34.0	38.0	11,000	25	Over'd	1907	0	0	8	20	0	535,000	0
Ft. Dodge, Des Moines & So.—Ft. Dodge-Rockwell, Iowa	146.6	195.1	1,200	d.c.	Over'd	1912	0	12	13	8	12	275,000	2,585,657
Grand Trunk (Canadian National)—Port Huron, Mich.-Sarnia, Ont.	3.7	12.2	3,300	25	Over'd	1908	0	9e	0	9	4	127,367	2,532,176
Great Northern—Skykomish-Wenatchee, Wash.	72.8	87.5	11,500	25	Over'd	1929	5e	5	0	8	4		
Illinois Central—Chicago-Richton, Ill.	37.8	152.1	1,500	d.c.	Over'd	1926	0	0	140	552	0	10,814,046	0
Long Island—New York, N. Y.	122.8	361.4	650	d.c.	Rail	1905c	7	8	742	895	8	42,914,621	
Bay Ridge-Fresh Pond Jc., N. Y.	11.9	84.4	11,000	25	Over'd	1927	0	7	0	0	30	0	
Michigan Central—Detroit, Mich-Windsor, Ont.	4.5	28.6	650	d.c.	Rail	1910	12e		0	38	47	474,530	1,728,084
New York Central—N.Y.-Croton-White Plains, N.Y.	63.1	330.1	650	d.c.	Rail	1906c	83	9	336	505	45	23,391,989	
New York, New Haven & Hartford—Nantasket Jc.-Pemberton, Mass.	6.9	16.2	650	d.c.	R&O	1895	0	0	8	36	0		0
Providence, R. I.-Fall River, Mass.	23.9	38.6	650	d.c.	Over'd	1901	0	0	22	42	0	702,382	0
Woodlawn, N. Y.-New Haven, Conn. f	75.2	519.6	11,000	25	Over'd	1907c	71	73	65	190	44	24,523,377	53,000,000
Stamford-New Canaan, Conn.	7.9	9.8	11,000	25	Over'd	1908	g	g	g	32	2	g	g
S. Norwalk-Danbury, Conn.	23.7	31.0	11,000	25	Over'd	1925	g	g	g	8	6	g	g
Port Morris-Fresh Pond Jc., N. Y. h	9.0	26.3	11,000	25	Over'd	1918c	g	g	g	18	21	350,000	9,149,807
Norfolk Southern—Norfolk-Virginia Beach, Va.	44.5	54.3	575	d.c.	Over'd		2		19				
Norfolk & Western—Bluefield-Iaeger, W. Va.	63.7	209.1	11,000	25	Over'd	1915c	0	16	0		34		
Northwestern Pacific—Corte Madera-Sausalito, Cal.	20.6	40.4	600	d.c.	Rail				44				
Pennsylvania—Camden-Atlantic City, N. J.	75.0	150.1	650	d.c.	Rail	1906	0	0	107	48	0	3,310,533	0
New York, N. Y.-Manhattan Transfer, N. J.	13.4	103.7	675	d.c.	Rail	1910	46	0	0	200	0		0
Philadelphia-Paoli-Chestnut-Hill, Pa.	36.2	129.8	11,000	25	Over'd	1915c	1	0	158	172	0	4,253,055	0
Philadelphia, Pa.-Wilmington, Del.	52.6	140.3	11,000	25	Over'd	1928	0	0	123	75	0	615,580	0
Reading—Philadelphia, Pa. and suburbs			11,000	25	Over'd	d							
Southern Pacific—Oakland-Alameda-Berkeley, Cal.	50.0	118.8	1,200	d.c.	Over'd	1911	0	3	87	780	0	4,022,617	0
Virginian—Roanoke, Va.-Mullens, W. Va.	134.0	229.8	11,000	25	Over'd	1925c	0	14	0	0	19	0	29,120,883

a To be completed in 1930. *b* To be completed in 1931. *c* Includes extensions in subsequent years. *d* Under construction, *e* Passenger and freight. *f* Operates on New York Central between Woodlawn and Grand Central Terminal, New York. *g* Included in Woodlawn-New Haven section. *h* New York Connecting R.R.

Low Records Made in

Trolley Wire Breaks

Continued improvement over previous figures was shown in 1929. Survey shows average reduction of more than 60 per cent accomplished during past eight years

DATA compiled by various of the leading electric railway systems in the United States and Canada show that the number of trolley wire breaks per year is steadily decreasing. Notable achievements in this direction have been made by the railways in Chicago, Detroit, Cleveland, Baltimore, Boston, Birmingham, Louisville, New Orleans and Toronto. Although the number of car-miles operated has remained practically constant for the group of properties included in this survey, the number of breaks has been reduced more than 60 per cent during the past eight years.

Reasons for failure can be classified under two main headings, namely, those due to uncontrollable causes and those due to inherent characteristics. Among the uncontrollable causes are burnouts by shovels, grinders, welders, foreign wires, and fires, while the causes of inherent failures are such as worn wire, defective fittings, burnt spots, crystallization or fatigue, flaws in wire and worn fittings. Reductions have been made under both classifications by systematic inspection and maintenance methods.

Differentiation between so-called uncontrollable causes and defects and wear varies somewhat on different properties. According to the classifications used in Boston, Detroit and Cleveland it appears that slightly more breaks are due to defects and wear than to uncontrollable causes, the ratio being about 60-40. Figures for breaks occurring on these properties in 1928 are summarized in the following table:

Causes of Trolley Wire Breaks

	Boston	Detroit	Cleveland	Total	Per Cent
Defects and wear.....	45	38	8	91	58
Uncontrollable.....	23	22	20	65	42
Total.....	68	60	28	156	100

Regular inspections are made either on a time basis or on the basis of the number of car passes. In Baltimore, for example, the entire overhead system is inspected once a month. In Chicago inspection is made after approximately 60,000 car passes and in Cleveland after 50,000. On lines where cars operate on a short headway this results in comparatively frequent inspection, while on the less heavily traveled lines the period between inspections is longer.

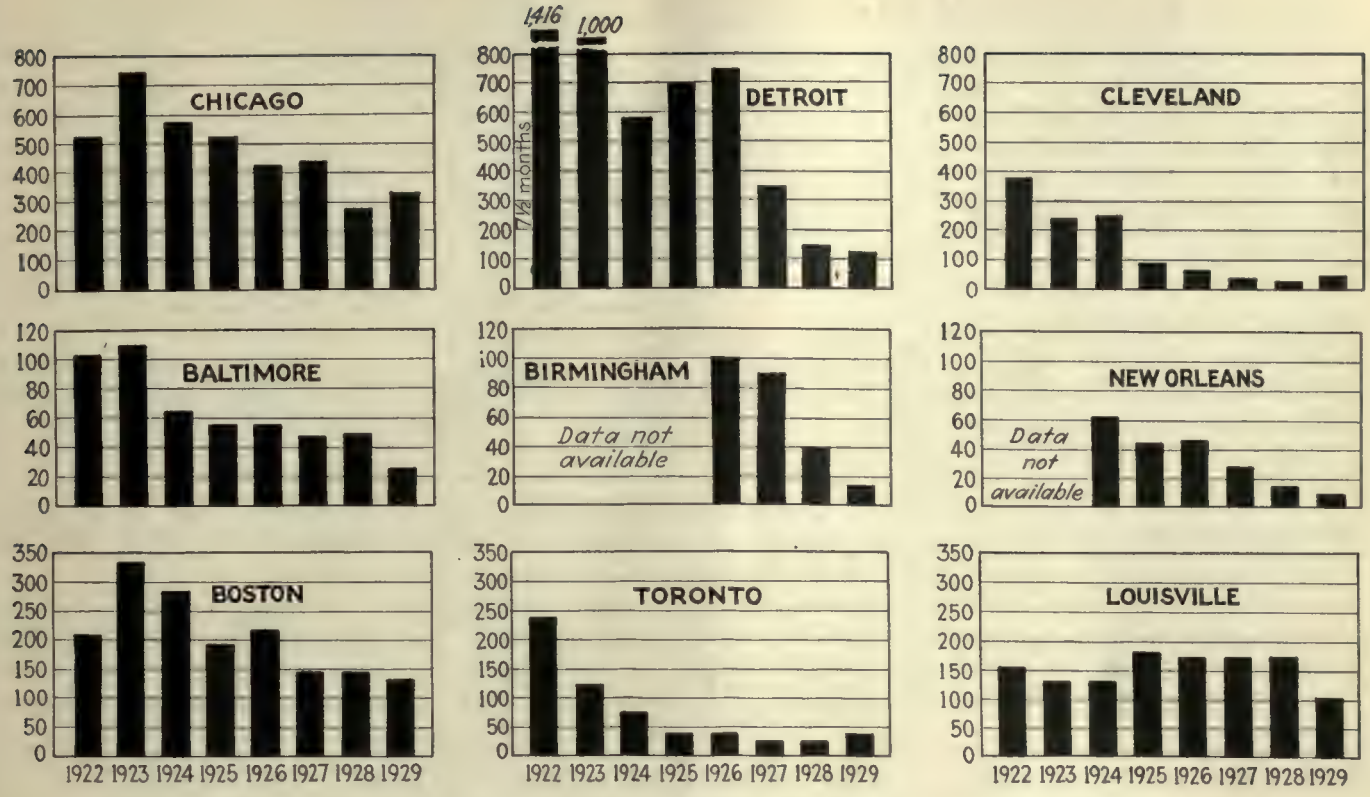
Since 1927 the Chicago Surface Lines has had a crew inspecting sections every 60,000 car passes. This crew also renews ears and other miscellaneous small fittings. If, however, the line crew finds any of the larger elements of the overhead system to be in need of replacement or repair and the crew cannot take care of the job themselves, they report this to the superintendent, who assigns a regular repair crew to make the required repairs. This company renewed an average of 173 miles of trolley wire per year from 1914 to 1927 but in 1928 replacements were reduced to 78 miles and during the first 9 months of 1929 only 74 miles was replaced. The Chicago Surface Lines has found also that the use of underslung ears and armor has been an important factor in the reduction of trolley breaks.

The Cleveland Railway considers it of great benefit to the maintenance of its overhead system to give the line crews a thorough training. Samples of wire in different stages of wear are shown to the men, and they are instructed as to just how far this wear may progress until the defective section has to be replaced in order to prevent a wire break and a consequent delay and tie-up of traffic. Cleveland line crews are provided with gages for inspecting the wire, thus enabling them to determine accurately just when a certain piece of wire has to be replaced. If a wire is reported to be in need of substitution a special line inspector makes a careful examination and submits a report. The decision as to the action to be taken is then left to the superintendent, who from his experience determines whether replacement is necessary or not.

The average length of wire maintained by each line crew of the United Railways & Electric Company of Baltimore is approximately 60 miles. The New Orleans Public Service and several others, however, allot 100 miles to each crew. As a rule, repairs on fittings are made during the day but replacement of wire, except for actual breakdowns, takes place during the night on most properties.

Line crews in Baltimore are available for 24 hours. During the day they are not kept at their stations but inspect continually the overhead system. They are required to call the dispatcher at regular intervals, informing him as to their location so that in case of emergency they can be located at once. Each crew is assigned a certain portion of the system for which it has sole responsibility, and is held accountable for the up-keep and general condition of the overhead structures. In this way the entire system is covered thoroughly not less than once a month.

In Baltimore it also has been found desirable to study the form of trolley wheel, as this has been responsible



Progress in overhead trolley wire maintenance during the last eight years is clearly shown by the general decrease in the number of breaks

for many of the breaks. As a result the U-groove type of wheel has replaced the V-type formerly in use on the property, with a reduction in the number of replacements of ears to about one-fourth of what they were four years ago.

Research in overhead construction characteristics has been carried on extensively by the Cleveland Railway. It has been observed that the ears which are near car stops, beyond the point where the car comes to a standstill, are most subject to burndowns due to the starting arc. These ears usually have to be replaced every inspection period. Ears farther away from the car stop will last three or four inspection periods. Ears located before car stops will only wear out on account of mechanical causes, as the current is almost always cut off as the trolley passes over them prior to coming to a stop and they will only be worn out by the friction of the collector.

Maintenance of Span Wires Important

Several railways included in this survey believe that best results are obtained when the contact wire is kept taut and the span wires comparatively slack. Proper maintenance of the span wires and ears is of great importance and has direct influence on the number of trolley wire breaks. Experience of the United Railways & Electric Company of Baltimore indicates that it is advantageous to have the ends of the ears taper ground to afford the trolley wheel an unobstructed approach and run-off, thereby increasing the wear on the wire itself. Another matter of vital importance is the use of only high quality material in the overhead structure.

Much attention is given also to the proper maintenance and inspection of the collecting devices on car equipment. Loose trolley wheels or shoes not only disturb the passengers by their abnormal noisiness but also cause more rapid wear of the contact wire. Many companies have enlisted the aid and co-operation of building contractors and others who move loose building equipment, shovels, etc., across car lines, and they thus reduce considerably the number of wires burned out or pulled down. One company has gone so far as to ask all contractors in its city to notify it when shovels or other equipment have to be moved across car lines, and a special line crew is assigned to assist them in crossing the track.

It is worthy of note that on all of these properties which have made excellent records in reduction of trolley wire breaks the improvement has not been made with a sacrifice of economy. Instead, the total cost has in nearly every instance been reduced. The line crews, instead of taking all their time in making emergency repairs that can only be considered temporary, now spend more effort in making permanent renewals of trolley wire as a matter of routine. The work is then done with more care and as a result the tendency to failure in service is greatly reduced. More efficient methods of stringing trolley wire have been devised in several of the cities mentioned. These have been noted in this paper from time to time. Reclamation of materials also is practiced to a large extent and considerable savings are made in maintenance expense.

Apart from any direct saving in cost of carrying on the work of the line department, all of the companies have made large savings in transportation expense on account of fewer delays to cars. There has also been a greater gross revenue due to the very small number of tie-ups as compared with the records of past years when the work of the line department was not organized as efficiently as it is at present.

Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Key System Transit Co., Oakland, Cal.					
October, 1929	617,783				*30,803*
October, 1928	629,852				*53,530*
10 mo. end. Oct., 1929	5,903,991				*842,904*
10 mo. end. Oct., 1928	6,017,318				*537,341*
Market Street Railway, San Francisco, Cal.					
November, 1929	799,843	656,119		143,724	85,452
November, 1928					
12 mo. end. Nov., 1929	9,584,907	8,084,583a		1,500,324	786,014
12 mo. end. Nov., 1928	9,795,829	8,324,868a		1,470,961	
Capital Traction Co., Washington, D. C.					
October, 1929	370,108	263,356	29,329	80,097	49,881
October, 1928	377,300	256,792	28,688	95,851	67,058
10 mo. end. Oct., 1929	3,564,165	2,558,662	275,210	751,534	446,781
10 mo. end. Oct., 1928	3,613,504	2,540,932	289,178	808,517	512,988
Jacksonville Traction Co., Jacksonville, Fla.					
October, 1929	96,472	79,495	9,037	7,389	
October, 1928	102,749	82,286	8,875	10,996	
12 mo. end. Oct., 1929	1,150,146	942,972	107,807	93,124	*64,125*
12 mo. end. Oct., 1928	1,219,114	973,281	108,261	130,781	*34,655*
Honolulu Rapid Transit Co., Honolulu, T. H.					
October, 1929	88,576	52,387	7,932	30,242	15,297
October, 1928	91,310	53,119	13,172	26,502	18,795
10 mo. end. Oct., 1929	878,604	504,821	90,011	294,685	180,445
10 mo. end. Oct., 1928	896,373	525,874	120,999	260,672	182,008
Honolulu Rapid Transit Co., Honolulu, T. H.					
November, 1929	85,384	51,473	7,932	27,044	15,407
November, 1928	86,169	51,366	13,046	22,829	15,124
11 mo. end. Nov., 1929	963,989	556,295	97,943	321,729	195,850
11 mo. end. Nov., 1928	982,543	577,241	134,046	283,500	197,130
Chicago Surface Lines, Chicago, Ill.					
November, 1929	5,246,124	4,056,792a		1,199,332	898,499k
November, 1928	5,208,725	4,052,149a		1,156,576	871,572k
Des Moines City Railway, Des Moines, Iowa					
October, 1929	180,198	124,397			13,053
August, 1929	177,305	134,732			154
United Railways & Electric Co., Baltimore, Md.					
October, 1929	1,460,077	962,111	140,656	371,860	87,260
October, 1928	1,437,781	908,727	156,669	384,384	92,584
10 mo. end. Oct., 1929	13,838,333	9,443,190	1,340,756	3,203,953	381,670
10 mo. end. Oct., 1928	13,482,451	9,035,030	1,309,056	3,260,461	416,253
United Railways & Electric Co., Baltimore, Md.					
November, 1929	1,407,934	919,304	142,421	355,717	72,462
November, 1928	1,360,315	870,431	140,568	361,455	76,260
11 mo. end. Nov., 1929	15,246,268	10,362,494	1,483,178	3,559,670	454,133
11 mo. end. Nov., 1928	14,842,766	9,905,462	1,449,625	3,621,916	492,514
Boston Elevated Railway, Boston, Mass.					
October, 1929	2,929,491	2,048,406	137,268	758,760	64,866
October, 1928	2,980,077	2,153,209	131,745	709,236	3,135
4 mo. end. Oct., 1929					780,512
4 mo. end. Oct., 1928					931,392
Eastern Massachusetts Street Ry., Boston, Mass.					
October, 1929	681,562	465,241	26,732	215,385	67,947
October, 1928	711,035	471,762	31,561	233,526	66,292
10 mo. end. Oct., 1929	7,154,387	4,510,930	318,417	2,517,670	784,164
10 mo. end. Oct., 1928	7,499,552	4,853,317	297,034	2,552,284	808,460
Boston, Worcester & New York Street Ry., Framingham, Mass.					
October, 1929	61,124	51,638	1,625	8,651	7,181
October, 1928	56,904	49,298	1,614	6,217	4,747
10 mo. end. Oct., 1929	618,580	499,955	16,523	113,757	99,057
10 mo. end. Oct., 1928	625,928e	534,133	16,148	77,675	62,826
Middlesex & Boston Street Railway, Newtonville, Mass.					
3 mo. end. Sept., 1929	260,095	230,722	8,702	20,671	*18,363*
3 mo. end. Sept., 1928	263,435	246,129	5,343	11,963	*28,127*
9 mo. end. Sept., 1929	859,897	623,319	25,399	111,179	*5,659*
9 mo. end. Sept., 1928	875,038	747,626	17,538	109,874	*11,552*
Department of Street Railways, Detroit, Mich.					
November, 1929	1,932,988	1,477,477	61,987	403,476	256,822
November, 1928	2,097,518	1,639,648	63,435	423,734	262,888
12 mo. end. Nov., 1929	26,520,209	20,983,064	748,021	4,907,464	3,245,066
12 mo. end. Nov., 1928	24,486,908	19,130,829	784,629	4,827,221	2,910,339
Duluth-Superior Traction Co., Duluth, Minn.					
3 mo. end. Sept., 1929	404,098	345,901		58,197c	*18,519*
3 mo. end. Sept., 1928	429,985	363,194		66,791c	*11,987*
9 mo. end. Sept., 1929	1,349,290	1,129,973		219,317c	*13,609*
9 mo. end. Sept., 1928	1,440,423	1,156,173		284,250c	37,053
Kansas City Public Service Co., Kansas City, Mo. (See E.R, J.-Dec.)					
October, 1929	761,938	578,448	41,675	141,813	66,889
October, 1928					
10 mo. end. Oct., 1929	7,434,118	5,627,347	416,750	1,390,020	614,329
10 mo. end. Oct., 1928					
Kansas City Public Serzice Co., Kansas City, Mo.					
November, 1929	746,136	615,461a		130,675	55,821
11 mo. end. Nov., 1929	8,180,255	6,659,560a		1,520,695	670,150

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Lincoln Traction Co., Lincoln, Neb.					
October, 1929					
October, 1928					
10 mo. end. Oct., 1929	394,582	324,651		49,801	9,819
10 mo. end. Oct., 1928	395,552	300,058		73,425	22,268
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
October, 1929	92,098	62,446	4,300	30,444	*779*
October, 1928	86,037	60,240	5,775	22,559	*9,037*
10 mo. end. Oct., 1929	846,679	633,507	74,860	248,404	*69,674*
10 mo. end. Oct., 1928	864,356	621,237	76,335	255,646	*62,296*
Jamestown, Westfield & Northwestern R.R., Jamestown, N. Y.					
9 mo. end. Sept., 1929	224,690	195,769	10,125	35,433	9,525
9 mo. end. Sept., 1928	187,296	193,023	10,125	476	*42,431*
Brooklyn-Manhattan Transit Corporation, New York, N. Y.					
November, 1929	4,987,071	3,345,314	273,696	1,443,361	673,707
November, 1928	3,970,021	2,477,877	264,260	1,307,147	605,723
5 mo. end. Nov., 1929	25,210,850	17,021,861	1,596,231	6,943,391	3,052,578
5 mo. end. Nov., 1928	20,000,199	13,142,902	1,382,900	5,886,399	2,432,232
Brooklyn & Queens Transit Corporation, New York, N. Y.					
November, 1929	1,929,432	1,549,294	98,255	304,005	178,518
November, 1928	1,964,189	1,571,694	110,651	305,156	176,636
5 mo. end. Nov., 1929	9,933,027	7,874,414	565,470	1,600,398	975,556
5 mo. end. Nov., 1928	10,076,325	8,373,900	537,715	1,272,400	626,412
Hudson & Manhattan R.R., New York, N. Y.					
November, 1929	1,059,113	510,620a		548,492	215,618
November, 1928	1,044,884	528,924a		515,960	180,933
11 mo. end. Nov., 1929	11,405,284	5,740,672a		5,664,612	1,974,920
11 mo. end. Nov., 1928	11,287,618	5,874,471a		5,413,147	1,722,957
Interborough Rapid Transit Co., New York, N. Y.					
October, 1929	6,387,991	3,995,255	202,126	2,190,638	*150,664*
October, 1928	6,143,922	3,668,587	202,456	2,272,878	473,808
4 mo. end. Oct., 1929	22,961,459	14,995,361	799,700	7,166,397	*607,651*
4 mo. end. Oct., 1928	21,543,264	13,953,164	795,566	6,794,533	*410,701*
Interborough Rapid Transit Co., New York, N. Y.					
November, 1929	6,276,425	3,666,977	201,549	2,407,898	*122,647*
November, 1928	5,925,143	3,578,340	201,588	2,145,124	345,546
5 mo. end. Nov., 1929	29,237,885	18,662,339	1,001,249	9,574,296	*730,199*
5 mo. end. Nov., 1928	27,462,408	17,531,504	997,155	8,939,748	65,155
Long Island Railroad, New York, N. Y.					
October, 1929	3,578,672	2,442,505	250,773	885,394	711,856h
October, 1928	3,664,309	2,452,332	219,239	992,738	821,416h
10 mo. end. Oct., 1929	35,131,457	12,268,686	2,744,112	9,524,574	7,918,561h
10 mo. end. Oct., 1928	34,209,872	10,482,000	2,402,214	8,079,786	6,591,414h
New York Railways, New York, N. Y.					
September, 1929	535,117	453,486a		81,631	20,554d
September, 1928	541,159	457,322a		83,837	19,096d
9 mo. end. Sept., 1929	4,696,094	4,110,354a		585,740	38,242d
9 mo. end. Sept., 1928	4,957,177	4,278,007a		679,170	115,175d
New York Railways, New York, N. Y.					
October, 1929	525,979	459,873a		66,106	5,105f
October, 1928	569,792	490,828a		78,964	27,223f
10 mo. end. Oct., 1929	5,222,073	4,570,227a		651,846	43,347f
10 mo. end. Oct., 1928	5,526,969	4,768,835a		758,134	142,399f
New York, Westchester & Boston Ry., New York, N. Y.					
October, 1929	218,467	136,808	24,047	59,480	*157,910*
October, 1928	215,179	147,383	20,525	48,026	*159,822*
10 mo. end. Oct., 1929	2,111,276	1,285,019	225,903	610,999	*1,544,185*
10 mo. end. Oct., 1928	1,985,809	1,327,487	199,486	469,810	*1,554,435*
New York, Westchester & Boston R.R., New York, N. Y.					
November, 1929	202,381			36,048	*180,500*
November, 1928	199,678			37,766	*169,752*
11 mo. end. Nov., 1929	2,313,658			636,402	*1,724,686*
11 mo. end. Nov., 1928	2,185,488			496,602	*1,689,136*
Staten Island Rapid Transit Co., New York, N. Y.					
October, 1929	229,918	161,196	18,000	50,722	40,227h
October, 1928	272,567	174,758	15,000	82,809	42,364h
10 mo. end. Oct., 1929	2,225,217	1,654,132	176,817	394,268	328,335h
10 mo. end. Oct., 1928	2,625,884	1,777,622	198,708	649,554	277,743h
Third Avenue Railway, New York, N. Y.					
October, 1929	1,320,170	1,007,189	92,385	241,078	*16,704*
October, 1928	1,365,099	1,031,860	96,329	245,046	8,838
4 mo. end. Oct., 1929	5,136,505	3,956,777	362,166	898,806	*139,775*
4 mo. end. Oct., 1928	5,196,596	4,002,640	380,357	884,359	*114,946*
New York State Railways, Rochester, N. Y.					
September, 1929	667,684	661,191a		15,131	*111,645*
September, 1928					
12 mo. end. Sept., 1929	9,253,828	8,075,266a		1,280,014	*237,303*
12 mo. end. Sept., 1928					
Troy City Railway, Troy, N. Y.					
12 mo. end. Sept., 1929	743,241	666,609	39,336	42,589	*57,411*
12 mo. end. Sept., 1928	770,852	545,588	38,140	83,824	*16,176*
New York State Railways, Utica Lines, Utica, N. Y.					
12 mo. end. Sept., 1929	1,433,952	1,009,386	111,226	39,621	*88,864*
12 mo. end. Sept., 1928	1,514,107	1,022,922	99,895	100,939	*27,959*

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Cincinnati Street Railway, Cincinnati, Ohio					
November, 1929.....	721,404	490,905	46,378	186,190	10,233
Community Traction Co., Toledo, Ohio					
October, 1929.....	306,768	244,503			2,383
October, 1928.....	324,341	236,885			
Lebanon Valley Street Railway, Lebanon, Pa.					
12 mo. end. Sept., 1929.	145,641	118,656*a*		17,921	*7,079*
12 mo. end. Sept., 1928	150,175	109,528*a*		31,134	6,134
Philadelphia & Western Ry., Norristown, Pa.					
October, 1929.....	71,112	37,112		34,000*e*	19,840
October, 1928.....	77,555	37,734		39,821*e*	24,664
Philadelphia & Western Ry., Norristown, Pa.					
November, 1929.....	67,305	49,552			17,753
November, 1928.....	68,796	49,176			19,620
11 mo. end. Nov., 1929	724,657	583,265			141,392
11 mo. end. Nov., 1928	762,606	609,786			152,820
Galveston-Houston Electric Railway, Houston, Texas					
October, 1929.....	46,399	26,557	2,716	17,125	
October, 1928.....	51,638	29,057	2,932	19,647	
12 mo. end. Oct., 1929	598,952	334,522	31,421	233,180	*37,078*
12 mo. end. Oct., 1928	656,615	383,429	31,483	241,701	*27,499*
Houston Electric Co., Houston, Texas					
October, 1929.....	289,119	176,475	27,114	85,529	
October, 1928.....	293,502	171,453	23,771	98,277	
12 mo. end. Oct., 1929	3,384,334	2,096,068	295,212	999,153	598,303
12 mo. end. Oct., 1928	3,319,296	2,028,260	294,231	996,804	588,675
Pacific Northwest Traction Co., Seattle, Wash.					
October, 1929.....	82,289	58,755	6,942	16,591	
October, 1928.....	70,403	67,383	5,179	*2,160*	
12 mo. end. Oct., 1929	937,596	733,532	56,471	147,590	30,825
12 mo. end. Oct., 1928	884,757	732,811	51,900	100,044	*66,408*
Seattle Municipal Railway, Seattle, Wash.					
October, 1929.....	477,244	401,911		76,271	26,368
October, 1928.....	483,615	405,651		79,678	27,014
10 mo. end. Oct., 1929					168,816
10 mo. end. Oct., 1928					*426,201g*
Calgary Municipal Railway, Calgary, Alta.					
10 mo. end. Oct., 1929	852,661	512,510		340,151*b*	37,464
10 mo. end. Oct., 1928					44,673
Edmonton Radial Railway, Edmonton, Alta.					
9 mo. end. Sept., 1929.	621,100	402,068		219,032	7,400
9 mo. end. Sept., 1928.					*3,881*
Edmonton Radial Railway, Edmonton, Alta.					
October, 1929.....	69,803	47,253		22,549	201
October, 1928.....	67,875	43,867		24,008	1,264
10 mo. end. Oct., 1929	690,904	449,321		241,582	7,601
10 mo. end. Oct., 1928	656,624	438,808		217,815	*2,616*
Lethbridge Municipal Railway, Lethbridge, Alta.					
9 mo. end. Sept., 1929.	45,315	36,587		8,728	*14,541*
9 mo. end. Sept., 1928.	44,712	41,225		3,487	*19,777*
British Columbia Electric Railway, Vancouver, B. C.					
September, 1929.....	1,169,278	784,097		385,181*b*	
September, 1928.....	1,101,483	746,296		355,187*b*	
3 mo. end. Sept., 1929.	3,494,751			1,135,632*b*	
3 mo. end. Sept., 1928.	3,284,759			1,031,641*b*	
British Columbia Electric Railway, Vancouver, B. C.					
October, 1929.....	1,230,278	698,747		531,531*b*	
October, 1928.....	1,145,394	631,879		513,515*b*	
4 mo. end. Oct., 1929..	4,725,029	2,617,947		2,107,082*b*	
4 mo. end. Oct., 1928..	4,430,053	2,453,297		1,976,856*b*	
Guelph Radial Railway, Guelph, Ont.					
11 mo. end. Sept., 1929	80,935	74,739	1,877	4,319	*29,227*
11 mo. end. Sept., 1928					*23,768*
Ontario Hydro-Electric Railways, Essex District					
11 mo. end. Sept., 1929	1,142,904	859,237	4,346	279,320	*47,568*
11 mo. end. Sept., 1928					4,592
Regina Municipal Railway, Regina, Sask.					
10 mo. end. Oct., 1929	343,579	212,973		130,605	12,671
10 mo. end. Oct., 1928					*2,808*
Saskatoon Municipal Railway, Saskatoon, Sask.					
10 mo. end. Oct., 1929	318,437	208,585	12,349	97,502	10,548
10 mo. end. Oct., 1928					3,587

Italic figures indicate deficit. *a* Includes taxes, *b* Net operating revenue. Before taxes. *d* Before adjustment bond interest. *e* Includes $41,793 special freight revenue. *f* Before adjustment bond interest. *g* Deficit after deducting $574,676 tax judgment. *j* Net after rents. *j* Before reserves. *k* After joint account expenses, federal taxes, and city's 55 per cent. *l* Including Brooklyn & Queens Transit System.

More Than 3,000,000,000 a Year Carried in New York

RIDERS on the various transit lines in the city of New York totaled more than 3,317,400,000 passengers in the 1929 fiscal year, according to the annual report of the New York Transit Commission. During the year ended June 30, 1929, the rapid transit and street surface lines in the city carried a total of 2,972,400,000 passengers, an increase of 33,500,000 or 1.1 per cent over the preceding fiscal year. In addition the Hudson & Manhattan Railroad carried 111,800,000 passengers, and bus companies (exclusive of the Tompkins Bus Corporation and the municipal bus lines) 111,200,000 passengers, an increase of 58,000,000 or 1.9 per cent over the preceding year. The traffic of the Tompkins Bus Corporation is not included in the above comparison as no figures are available for the fiscal year 1928. This company carried 14,500,000 passengers in 1929. Traffic on the municipal bus lines, which do not report to the commission, has been estimated at 107,500. The total traffic, therefore, during the year ended June 30, 1929, on the rapid transit lines, Hudson tubes, street surface cars and bus lines, was more than 3,317,400,000 passengers.

The distribution of this traffic by classes of service was as follows:

Division of Passenger Traffic, New York Transportation Lines

	Per Cent of Total Traffic
Interborough Rapid Transit Co.	
Subway division	28.11
Elevated division	10.51
Total, I. R. T.	38.62
New York Rapid Transit Corporation	20.82
Total, rapid transit lines	59.44
Street surface lines	30.16
Hudson & Manhattan Railroad	3.37
Bus lines reporting to the commission	3.79
Municipal bus lines (estimated)	3.24
Total	100.00

Rapid transit traffic alone amounted to 1,971,800,000 passengers, or 53,300,000 (2.8 per cent) more than in 1928. The following tabulation shows the distribution by boroughs of the ticket sales or fare collections at all of the rapid transit stations, both Interborough Rapid Transit Company and New York Rapid Transit Corporation (Brooklyn-Manhattan Transit System), during the fiscal years ended June 30, 1929 and 1928:

	Fiscal Year		Increase	
Stations in	1929	1928	Number	Per Cent
Manhattan.....	1,149,260,509	1,135,237,354	14,023,155	1.24
Bronx.....	215,349,575	204,925,096	10,424,479	5.09
Brooklyn.....	486,137,756	466,798,253	19,339,503	4.14
Queens.....	119,650,532	110,167,414	9,483,118	8.61
Unallocated.....	1,446,787	1,376,628	70,159	5.10
Total.....	1,971,845,159	1,918,504,745	53,340,414	2.78

Fare collections at the Times Square subway stations during the two fiscal years were as follows:

	1929	1928	Increase
Interborough lines.....	55,944,891	55,093,646	851,245
N. Y. R. T. lines.....	35,936,443	34,630,250	1,306,193
Total, Times Square.....	91,881,334	89,723,896	2,157,438

NEWS *of the Industry*

LATE NEWS

Kansas City, Mo.—The directors of the Kansas City Public Service Company on Dec. 26 approved the tentative plan of the company to purchase and operate the Yellow and the Checker cabs. The purchase contract still is in process of negotiation. Under the contract the railway would pay $187,000 cash for the property and assume a bonded debt of $375,000. The railway hopes to effect economies by combining the operating departments of the two companies.

✦

Los Angeles, Cal.—On Dec. 14, $118,041 was distributed in bonus checks and special awards to trainmen of the Los Angeles Railway. Of that amount $17,830 covered special awards which, in addition to the earned bonus, were divided among 912 men of the 2,046 who participated in the distribution. Many more men participated in the award this year than did so a year ago.

✦

New Orleans, La.—Judge Wayne G. Borah in the United States District Court has issued a temporary order restraining 815 alleged jitney operators from using their automobiles to carry passengers in competition with the street cars of the New Orleans Public Service, Inc., on which the union crews struck last July.

✦

St. Louis, Mo.—The St. Louis Public Service Company's new experimental fare of a twelve-ride weekly ticket for $1, single adult rides for 10 cents and children's at 5 cents instead of 3 cents, went into effect on Dec. 30. Six children's tickets may be purchased for 25 cents while ticket holders riding more than twelve times in any one week may secure the extra rides at 5 cents each. Hereafter ticket riders must present their tickets to be punched by the conductor when paying the fare, but there will be no limits on the number of times a ticket may be used in any week.

✦

New York, N. Y.—Standardized taxicabs for New York City have been agreed on by manufacturers, owners and Police Commissioner Whalen. All cabs now on the streets or in process of manufacture will be permitted to be sold and operated in the city, but all taxicabs manufactured after Feb. 1 for use in New York City must comply with new regulations. Cabs are to be of two classes, heavy cabs seating five or more passengers and light cabs seating two or three. They are to have larger rear windows.

✦

Boston, Mass.—The new high-speed trolley line between Mattapan and Ashmont was opened to the public on Dec. 21 by the Boston Elevated Railway. The new line cuts the running time from Mattapan to the center of Boston by nine minutes.

Late News Continued on Page 54

Eight-Cent Cash Fare Announced in Cleveland

New Rate in the Ohio City Went Into Effect on Jan. 1. Tickets Sell at Rate of Seven for 50 Cents

THE Cleveland Railway, Cleveland, Ohio, on Dec. 26, announced an increase in the rate of fare from 7 to 8 cents, effective on Jan. 1. The increase had been predicted, following a decision against the company by the United States District Court of Appeals in an income tax case.

Under the new rate of fare, tickets will be sold in strips of seven for 50 cents. In East Cleveland and Cleveland Heights, the two suburbs which pay a service-at-cost fare based on the Cleveland rate, the cash fare will advance from 9 to 10 cents, but the ticket rate will continue to be six for 50 cents.

The result of the company's announcement was an immediate revival of agitation for adoption of a zone system of fares urged by the company a year ago but tabled by the street railway committee of the City Council. President Alexander said:

"For many months the interest fund has been at a figure which would have made an increase necessary had we not been hopeful of a favorable decision in our long-pending income tax suit. The decision of the United States Court of Appeals, while a partial victory, makes impossible the continuance of the present rate until we can have appealed the case and have had a final adjudication.

"It is regrettable that the city did not agree with us at the beginning of the year on some application of the zone system which would make fares more equitable to riders. As it is, the increase falls largely on the city rider, whose ticket rate, as well as cash rate, is advanced.

"The East Cleveland and Cleveland Heights riders, generally, will pay no increase, only the cash rate and local fare being changed.

"Lakewood, of course, advances with Cleveland, although retaining its local rate. Perhaps with the differential between city and suburbs reduced to approximately 1 cent, except in cash rates, the making of a new franchise by Lakewood will be possible."

San Francisco Convention Plans Maturing

THE 49th annual convention of the American Electric Railway Association will be held at San Francisco, Cal., June 23 to 26, inclusive, 1930.

The national character of the convention brings together several thousand delegates. A sizable delegation from the various European and South American memberships of the association is also expected.

Committees are now at work under the direction of the general chairman, W. V. Hill, manager of the California Electric Railway Association, 58 Sutter Street, San Francisco, Cal. Edwin C. Faber, vice-president of Barron G. Collier, Inc., New York City, will have charge of the three special trains.

Cincinnati-Lake Erie Line Opened

The Cincinnati & Lake Erie Railroad, formed recently through the consolidation of the Cincinnati, Hamilton & Dayton Railway, the Indiana, Columbus & Eastern Traction Company and the Lima-Toledo Railroad, opened its electric line, linking the Ohio River with Lake Erie, on Dec. 31. The new system, announced by Dr. Thomas Conteem is the longest, straight main electric interurban line in the world. It covers a route of 220 miles.

The new line will offer high-speed passenger and freight service with improved equipment. New types of motors have been developed for cars in this service which, under tests, have attained a speed of 75 m.p.h.

Consolidation of the three interurban lines was engineered by the Cincinnati, Hamilton & Dayton Railway under the direction of Dr. Thomas Conway, president of that line.

Officers of the new Cincinnati & Lake Erie Railroad, besides President Conway, are William L. Butler, Philadelphia, executive vice-president; J. H. McClure, Dayton, vice-president in charge of public relations; Richard Breckinridge, Cincinnati, vice-president in charge of traffic; H. C. Donecker, Dayton, vice-president in charge of research, and W. D. Gordon, Philadelphia, secretary and treasurer.

Cars, Buses, Taxis and Planes in Grand Rapids

A municipal transportation system which ties up street cars, buses, taxicabs and airplanes, has been effected in Grand Rapids, Mich., by the Grand Rapids Railroad. The move is looked upon by Louis J. DeLamarter, general manager, as one of the outstanding steps in city transportation service. He points out that the combined services of street car, bus and taxicab automatically will help each other to serve further the residents of the city, permitting the city's prin-

cipal transportation organization to meet every citizen's needs.

While the railroad has not taken over an air service, the Furniture Capital Air Service, Inc., has taken offices in the street railroad building and a fleet of planes is to be available at all times for aerial transportation service from Grand Rapids to any other city in the state with a landing field.

Special attention will be paid to emergency and commercial calls, which may be filed with the railway central office. The system has been worked out so completely that a person wishing plane service may call for a cab to the airport and his taxi driver will have his ticket for the flight when he arrives.

The entire system will be under municipal regulation.

The railroad plans a special school of instruction for the cab drivers. A similar school long has been in operation for trainmen.

The company also has announced it will spend approximately $100,000 in 1930 on improvements. Twenty new electric coaches will be placed in service as soon as possible, Mr. De Lamarter asserts.

Richmond Hard Hit by Storm

The recent cold wave, which froze up private automobiles and even made the average home in and around Richmond, Va., uncomfortable at times, was not in the least partial to the Virginia Electric & Power Company. The movement of cars and buses, which is ordinarily according to carefully worked out schedules, became exceedingly irregular. Frozen air lines, slippery tracks and pavements, disabled automobiles and trucks, and other causes contributed to the confusion. On Dec. 28 there were 21 fire alarms. General Manager Penick said:

"The other day we had a trolley break, the second in a year, and service was crippled temporarily over a considerable area, but the ice and sleet were the main contributors to irregular service.

"We are not citing the difficulties with which we have to contend as alibis for failures of our service, but we want our patrons to know the facts and when they know, we feel sure they will bear with us under such conditions."

Edward Dana on the Air

Edward Dana, general manager of the Boston Elevated Railway, Boston, Mass., gave the first of a series of radio broadcasts on Dec. 10 from Station WEEI. The broadcast is identified as the "El Service Hour" intended to give the public a better insight into and understanding of the problems and difficulties confronting present-day transportation companies. Mr. Dana said in part:

"We hope to make clear matters which cause misunderstandings, and demonstrate that our only aim is successful operation and satisfactory service. At present the equipment of the Boston Elevated Railway is modern in every respect. It compares favorably with the best in use anywhere in the country. By reason of this modernized equipment your trips on the Elevated system have been made more comfortable, speedier and safer."

Mr. Dana explained that the elevated carried 1,000,000 passengers daily. He said the company would do its utmost to render efficient service in all respects and under all circumstances.

City and Company Co-operate on Buffalo Improvements

The International Railway, Buffalo, N. Y., has been requested by the Buffalo City Council to undertake track reconstruction and roadbed improvements on 40 streets covering 32 miles of single track and involving an expenditure of approximately $1,920,000 for 1930. The tentative program was suggested by the municipal authorities at a conference attended by B. J. Yungbluth, president of the railway. President Yungbluth expressed the belief that this program was too much for the company to undertake in a single year, but consented to cooperate with the City Council in reaching an agreement on streets where the work is most essential.

Denver Fare Ordinance Advanced

With only one change, boosting from $10,000 to $15,000 annually the amount to be paid for use of city streets, the Denver Tramway Corporation ordinance, asking higher fares and permission to substitute bus routes for unprofitable rail lines, was passed on first reading by the City Council of Denver, Col., on Dec. 23.

A second passage Jan. 5 will make the bill operative, carrying provisions for 10-cent fares, or three tokens for 25 cents, and a cross-town bus route, in addition to several bus routes providing service for districts in which it seems desirable to supplant cars.

Two formal protests, representing 1,200 residents of East Denver and Montclair, were registered prior to passage of the ordinance. The protestants do not believe buses will provide adequate transportation facilities in their territory where electric trams are to be eliminated. On other phases of the bill there were no objections.

New Jacksonville Franchise Up Jan. 14

The Miller draft of the proposed franchise of the Jacksonville Traction Company, Jacksonville, Fla., to take the place of the one under which it now operates but which expires in 1932, will go to the company officially at once. The grant was placed on first reading at a special session of the City Council on Dec. 19, and referred to the laws and rules and public service committees jointly, with instructions to the recorder that copies be sent the company, along with a copy of the report and recommendations of the public service committee that this action be taken.

Under the recommendations of the public service committee the company will be asked to make a written reply to the communication, giving its views on the proposed franchise, as drafted by City Attorney Austin Miller, not later than Jan. 14, the next meeting date of the Council.

Louisville Situation Reviewed

President Barnes Goes Over the Accomplishments During His Regime in Southern City—System Returned to Dividend-Paying Basis

PRESIDENT J. P. Barnes, of the Louisville Railway, Louisville, Ky., issued a statement to the stockholders on Dec. 7 regarding the condition of the company. When Mr. Barnes became president of the company it was laboring under the handicap of a 5-cent fare, under an eighteenth-century type of franchise ordinance. Eventually a 7-cent cash fare was secured; then under federal injunction fares were advanced to 10 cents cash with three tickets for 25 cents.

	Service Given	Earings	Expense
1920.....	11,307,652 (Car-miles)	$4,146,507.28	$3,229,187.38
1928.....	13,136,871 (Car and bus-miles)	4,847,000.40	3,494,755.52
Increase....	1,829,219	$700,493.12	$265,568.14
Per cent....	16.18	16.89	8.22

The number of passengers carried has fallen off, due in part to higher fares, but also in part to the fact that there is considerable unemployment in Louisville at this time. Moreover taxicabs are operating at the rate of 2 miles for 25 cents, and are carrying four passengers for a single fare.

The increase in revenue under the new fare rates became effective too late to affect materially 1929 operations. The belief was expressed, however, that when normal conditions of employment and business in Louisville are restored, the company's earnings will show a material improvement over former years and permit the payment of greater dividends.

The statement set forth in detail the amount of dividends that have been paid under the present management.

The growth of the company is shown in the accompanying table:

President Barnes said in part:

"Not until the recent decision in our fare litigation did we achieve adjustment of the various matters criticised by the bankers who said, several years ago, that under the ordinance regulations in effect at that time neither legal right nor our ability to earn was sufficiently established to assure economical refinancing.

"When the present management took charge in 1920 no dividends, preferred or common, had been paid for two years, and the company's total liabilities exceeded its total assets by more than $400,000. By 1923 our operations and earnings had so improved that we were able to begin paying off accrued dividends on the preferred stock and, since that time, we have paid not only these dividends, but all current preferred dividends and $582,652 common dividends, as well. The total dividend payments have amounted to $2,332,652. At the

close of 1928 there had been accumulated a corporate surplus of $868,328. The report of Humphrey Robinson & Company, accountants, made as of Dec. 31, 1928, shows the common stock of the company to have a book value of $110 a share.

Refinancing Ahead

Our constant effort has been to build up a regular, dependable net earning capacity sufficient to meet the bankers' requirements for refunding operations.

"Since 1923 there have been added to the company's property 121 new cars, 43 buses and numerous smaller items of equipment. Many renewals and improvements of carhouses and track have been made.

"In view of this growth in earnings, addition to capital and improvement of property, there can be little doubt that the present low market quotations of Louisville Railway securities are due to uncertainty in the minds of investors as to the refunding of the $6,000,000 first mortgage bonds due July 1, 1930. We are continuing active negotiations for this refunding. Several plans are under consideration and, therefore, it is impossible to state at this time just what the final proposal will be. It may be that no refinancing plan will be perfected until after the decision of the city's fare appeal, which will be argued in the circuit court at Cincinnati on Jan. 6, 1930. As soon as positive recommendations can be made, I shall advise you fully."

LATE NEWS

Continued from Page 52

Pensacola, Fla.—Gulf Power Company forces are completing construction of the new tracks in the western section of the city for the Bayshore line. Under an agreement with the Frisco Railway when that road purchased parts of the Bayshore line, the power company will operate its Bayshore cars into the city over the spur line. The Frisco Railway is improving the portion of the Bayshore line purchased.

✦

Seattle, Wash. — Residents of the White River Valley, through which the abandoned Seattle-Tacoma interurban line is routed, have organized to formulate a plan whereby re-establishment of the electric system might be effected. A second meeting has been scheduled for Jan. 15 in the Auburn City Hall. Stage schedules were declared inadequate to serve transportation needs of valley residents. T. J. Ferguson, Auburn, is active in the movement.

✦

Chicago, Ill.—Failure of the City Council of Chicago to initiate action in the matter of the new subway and disputes among officials of the elevated and the surface lines as to whether the proposed State Street subway shall be for elevated trains or for both "L" and surface cars are cited as the two major causes of delay. The fact that the $57,000,000 railway fund, accumulated out of payments made by the surface companies to the city, is now represented in the main by paper, chiefly tax anticipation warrants, is another obstacle in the way of an underground for the Windy City. One definite step toward settling some of these problems was taken recently by a Council sub-committee which will seek to have the telephone company and the Commonwealth Edison company contract with the city to place their underground wires and mains in gallery space in the subway.

✦

Far Rockaway, N. Y.—The Transit Commission and the New York City Board of Transportation are holding a series of conferences for the purpose of working out a co-ordinated policy with respect to the Rockaway Branch of the Long Island Railroad. This is the branch which the company is desirous of selling to the city. The city cannot immediately answer the negotiation count. It will probably be five years before it will have in operation a trunk to Manhattan available to carry the Rockaway traffic, and during that time, unless some makeshift plan is adopted, there might be no relief from the grade-crossing menaces. Further, the estimates of the Board of Transportation engineers as to the cost of a new subway have not been fully developed, so that even if a price were fixed as between the railroad and the city the comparison of that price with present estimates of a new structure would be inconclusive.

✦

Fond du Lac, Wis. — Offering was made on Dec. 16 of a new issue of $2,500,000 Wisconsin Power & Light Company first lien and refunding mortgage 5 per cent bonds, due Dec. 1, 1958, at 96½ and interest. The corporation supplies electric light and power to 268 communities located in 30 counties of central and southern Wisconsin, and wholesales power to 65 communities having an aggregate population exceeding 700,000. In addition it gives 98 communities gas, water, electric railway, bus and heating services.

✦

Philadelphia, Pa.—The new escalator on the northwest plaza of City Hall on the Philadelphia Rapid Transit subway has been placed in operation. The escalator saves 43 of the 64 steps from the station platform to the surface. Passenger approach is by a short stairway from the platform to the mezzanine. Three passengers may ride abreast on the escalator, which will carry from 8,000 to 10,000 passengers per hour. It was built at a cost of $80,000.

✦

Aurora, Ill.—The Illinois Commerce Commission on Dec. 18 approved the issuance of $3,400,000 of 6 per cent ten-year gold notes of the Chicago, Aurora & Elgin Railroad to reimburse the company treasury for capital expenditures for recent extensive improvements made by the railroad.

✦

Tulsa, Okla.—The twelfth annual convention of the Oklahoma Utilities Association will be held at the Mayo Hotel here on March 11, 12 and 13, according to a decision reached by the executive board of the association. Active arrangements for the convention will soon be under way.

Waverly, N. Y.—Permission has been granted the Waverly, Sayre & Athens Traction Company by the New York Public Service Commission to operate buses in place of street cars from the New York-Pennsylvania state line at Cayuta Avenue in Waverly, N. Y., over certain streets in the village. Evidence showed that the company had paid no dividends in 36 years and that it is two years behind on its bond interest.

✦

Oakland, Cal.—Reconstruction of the street car tracks and paving on San Pablo Avenue, from the city limits of South Berkeley, Cal., to the north line of Ashby Avenue, is now being undertaken by the Key System Transit Company, according to the announcement of Alfred J. Lundberg, president.

✦

Richmond, Va.—Continued operation of the Richmond-Ashland Railway is possible only if citizens served by the road rally to its support. A committee of stockholders has been named to lay the matter before the people in territory adjacent to the 18-mile electric line. Due to loss of revenue and large expenses incurred in making emergency repairs to the viaduct leading into the station on West Broad Street, the company did not expect to be able to meet in full the interest payment on the mortgage bonds due on Jan. 1.

✦

Pasadena, Cal.—Elimination of every grade crossing in Pasadena, eventual electrification of the railroad, elevation of tracks, and installation of double tracks from Los Angeles to San Bernardino are plans which the Santa Fe Railroad is said to be about ready to make public.

✦

Ithaca, N. Y. — The Public Service Commission has decided to defer action on the application of the Ithaca Railway, Inc., for approval of the exercise of rights and construction under a franchise granted to it by the city of Ithaca on Aug. 7, 1929. This action will give the petitioner an opportunity of applying to the commission for approval of a reorganization following the sale of the property and franchises of the former Ithaca Traction Company in 1928. The sale was made, pursuant to an order of the Supreme Court, to Sherman Peer, as agent of a corporation to be formed, who operated the railway until it was turned over to the Ithaca Railway, Inc. The commission held that the reorganization should first be authorized by the commission before the company is in a position to receive the approval which it seeks in the present application.

✦

South Bend, Ind. — Sale of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway under foreclosure was postponed on Dec. 28 until Feb. 1. Bankruptcy proceedings were entered to satisfy claims of several mortgage holders.

✦

Athens, Ga.—After Jan. 1 people who hail autoists for a lift inside the city limits of Athens will be liable to prosecution by the city. Under the new law no one will be allowed to ask for auto rides while standing in the streets or on the sidewalks. Any speech, motion or gesture to an autoist for a ride will be considered a violation of the law.

(*Continued on Page 57*)

Bridge Line Rolling Stock to Be Sold

Commissioner Albert Goldman of the Department of Plant and Structures of New York City, through whom, as the custodian of bridges, the deal with respect to the 3-Cent Line was transacted, states that very soon he proposes to dispose of the seventeen cars under the hammer. He will advertise them for a period and then knock them down to the highest bidder. The cars constituted the rolling stock of the defunct Manhattan Bridge 3-Cent Line, which went out of business on Nov. 13, when the city handed its owners a check for $206,750.29 in return for which the company abandoned its operation over the Manhattan Bridge and Flatbush Avenue extension between Fulton Street, Brooklyn, and the Bowery, in Manhattan, returned its franchise to the city and deeded the municipality its tracks, poles, trolley wires and cars—all it owned save some real estate on which is located its carhouse in Brooklyn.

$25,000,000 Expenditure Ahead for St. Louis

Stanley Clarke, president of the St. Louis Public Service Company, St. Louis, Mo., has informed the St. Louis Transportation Survey Commission that the company would spend $25,000,000 or more for additional equipment and other betterments to service, including extensions, if it could raise the money. To the end that this may be accomplished the commission has created a finance committee to work out a plan to enable the company to make the expenditures suggested by R. K. Kelker, Jr., consulting engineer for the commission.

In a recent report to the commission Mr. Kelker suggested the company spend $23,776,000 as follows: Rerouting car lines, $726,000; extensions, $1,338,000; feeder buses, $512,000; 800 new cars, $13,800,000; additions to substations, $1,400,000, and street paving between car tracks, $6,000,000.

He also recommended elimination of hundreds of stops and the ultimate driving of service cars or "jitneys."

Mr. Clarke is a non-voting member of the Transportation Survey Commission.

B. E. Sunny Sees Chicago Settlement Ahead

B. E. Sunny, chairman of the protective committee of the Chicago City & Connecting Railway collateral trust bonds, in a letter to the depositors of bonds says:

"In the letter of June 11, 1929, your protective committee reported that the necessary enabling legislation had been approved by the Governor. The subcommittee of the local transportation committee of the city of Chicago, in charge of working out a new ordinance, has completed a tentative draft of the proposed new franchise.

"The sub-committee left blank three or four sections dealing with the questions of rate of return on the capital account of the new company, amortization and sinking fund. The draft of these sections was deferred till the views of the reorganization committee could be obtained.

"As soon as the views of this committee on the questions of rate of return, amortization, sinking funds and other like problems can be obtained, it is hoped that the drafting of the new franchise will be completed promptly and sent to the City Council for consideration and approval, subject, of course, to a referendum. It is hoped that the ordinance can be passed and ample time given for a thorough discussion of the provisions of the ordinance so that a referendum may be had in the spring or early summer of next year"

Seattle Council Has Two-Year Moratorium Proposal

The City Council of Seattle, Wash., is now ready to take the last step necessary to make the two-year moratorium on the municipal railway bond redemption effective. Two ordinances have been introduced at a special Council session, and can be brought up immediately for passage. The plan is to limit payments to the bondholders to interest during 1930 and 1931 so as to enable the city, during the next few weeks, to repay fully the loan from the Water Department that was necessary to make the payments for 1929 on the purchase bonds. The Water Department loan should be wiped out before March. Heretofore the city has paid to the owners of the property now comprising the municipal lines not only interest but a part of the principal sum.

With the floating debt of the municipal railway wiped out, funds for the purchase of new cars and a modest rehabilitation of the lines will begin to accumulate. There has been no decision as to whether track improvements or new cars shall take precedence, though there is general agreement that the track work should take precedence.

Mayor Frank Edwards has declared that this is the first dividend it has been possible to give the car riders whose money is paying for the railway system, and he has demanded the best rolling stock available. At the same time the Mayor has repeatedly urged that in providing new cars as much work as possible be done in Seattle. He said:

"In this whole proceeding the car riders are entitled to first consideration, because it is their patronage which makes the purchase of the railway system possible and their money that keeps it going."

Inquiry Into Ownership of New York Properties

The Public Service Commission of New York by order issued on Dec. 27 directed the United Traction Company, the New York State Railways and the Schenectady Railway to produce before it in Albany, on Jan. 8, records in an inquiry instituted by the commission, on its own motion, to determine:

The ownership of the capital stock of the companies:

Whether any transfer or assignment of capital stock has been made in violation of the provisions of the public service commission law.

Whether any of the companies has made or recorded upon its books any transfer or assignment of capital stock in violation of the provisions of the public service commission law.

The order directs each of the three companies to produce at the hearing "its stock book and any and all other records showing or tending to show the present ownership of its capital stock and any and all transfers or assignments thereof" by the United Traction Company since June 17, 1927, by the New York State Railways since Jan. 1, 1928, and by the Schenectady Railway since Jan. 1, 1929.

Speeding Up the Louisville Service

The recent experiment by the Louisville Railway, Louisville, Ky., of allowing motormen on Market Street to disregard running time on outbound trips in certain territory has proved successful and is pleasing passengers by enabling them to reach their destination in a shorter period of time. In consequence the company has announced that, beginning at once on specified lines and at locations indicated, motormen may disregard running time and go on to the end of the line as soon as they can do so safely. Leaving time at the ends of the line and at all places other than those designated must be strictly observed.

In the territory in which passengers are picked up in quantity and at transfer points, the company enjoins upon its employees careful attention to the even spacing of the cars and strict observance of the running time.

In the territory where motormen are allowed to disregard the time schedule, cars must be operated with the proper slowdowns for dangerous street crossings. The exceptions that have been made to the regular running rules are solely to prevent the cars from having to drag in order to observe the schedule religiously.

Chicago Transfer Demand Deferred

The Chicago City Council's committee on local transportation has decided not to initiate before the Illinois Commerce Commission proceedings to obtain transfers between the surface and elevated lines. The resolution to this effect presented by Alderman John A. Massen eighteen months ago was sent instead to the subcommittee, which has been drafting the proposed new franchise.

Committee members who opposed starting proceedings before the state commission declared that to do so might interfere with the negotiations with the companies for a new ordinance. All agreed that better service is imperative, and favored incorporating the universal transfers in the new ordinance.

At the same session, a subcommittee of five councilmen was appointed to go before the commission with a request that the Surface Lines be permitted to use part of its $18,000,000 renewals and depreciation fund to build 125 miles of double-track extensions and to install feeder bus service.

The companies point out that the draft is as binding as possible on this point, and that the entire question of whether or not the companies will carry out the promised program depends on their ability to get the $200,000,000 of new monies required.

Other objections of the Aldermen to the proposed ordinance draft had to do with its failure to determine which faction shall pay for building the connection between the elevated system and the subway. The companies wish the city to do this, but the subcommittee desires that the companies reconsider the matter.

The Aldermen rejected the company's alternative section that the city pay for paving the surface line's right-of-way. They consider the section ambiguous which deals with removal of tracks and structures no longer necessary (which may or may not include the elevated loop). They also wish to include a provision that the new company pay the city 3 per cent of its gross receipts.

In general, the attitude of the Aldermen is one of uncertainty. They believe that the city is accorded less power in the proposed ordinance than it enjoys at present over the surface lines.

The Aldermen favor a subway to be built by the city through the central business district.

Public Service Fare Decision Based on Valuation

Newark Paper Analyzes Operation of New Jersey Company So Its Readers May Be Adequately Informed

WHEN the Public Utilities Commission of New Jersey handed down the fare decision in the Public Service Co-ordinated Transport application, the finding for the company granting a 10-cent cash fare with ten tokens for 50 cents, which went into effect on Jan. 1, was based on failure to earn a 7 per cent return. The valuation of the property was fixed by Judge Haight, who was special master in the company's application of 1921. In a letter to President McCarter, the commission stated that the company's operating income last year fell short by $3,300,000 of what a return of 7 per cent would have been upon the Haight valuation brought down to date. However, the commission also indicated that the company's operating revenue fell approximately $1,900,000 short of a 7 per cent return upon its own valuation at the same time, brought down to date.

An analysis of the earnings of the Public Service Co-ordinated Transport and its predecessors, the Public Service Railway and the Public Service Transportation Company, was made in a special article appearing recently in the Newark *Evening News*. The article points out that the only things about which the commission is concerned in its present decision are the operating income, that portion of the revenue remaining after deducting operating expenses, depreciation and taxes, and the valuation of the property placed on it by the authorities. The company's capitalization is not in any sense a factor, and it is only necessary that the company be allowed to earn a reasonable return upon the value of the property.

Nobody knows conclusively what a fair value of Public Service Co-ordinated Transport is, according to the article. There has been no valuation of the property since 1921, at least by the commission or the courts. In the 1921 fare case, there was a wide variance in the valuations submitted. The company claimed a value of approximately $200,000,000. An appraisal by Ford, Bacon & Davis, authorized by the Legislature, placed the value at $125,000,000. Mark Wolff, a utility expert, made a study resulting in an estimate of $100,000,000 historical cost. Other valuations were submitted.

After a study, the utilities commission finally decided that $82,000,000 was the value for rate-making purposes. The company carried the case to the federal courts and Judge Haight, as special master, found a value of not less than $110,000,000. These last two figures stand out, the one as the commission's findings and the other as the court's final decision.

Since 1921 there has been a revolution in the company's transportation methods. Buses have come to the fore and have passed trolleys in volume of business. Trolley lines have been abandoned and replaced by buses. How much remains of the original trolley inventory no one outside of Public Service itself knows. Therefore, nothing short of a new inventory and appraisal would establish what would be a fair value today.

Public Service has spent millions of dollars in acquiring bus lines and in purchasing new buses. It is debatable whether the company is entitled to receive a return upon the difference between a fair price for the buses and what it actually paid.

ANALYSIS OF RESULTS OF NEW JERSEY OPERATION

Year	Actual Operating Income	Needed Operating Income for 7 Per Cent Return on Judge Haight's Decision	Needed Operating Income for 7 Per Cent Return on P.U.C. 1921 Valuation	Needed Operating Income for 7 Per Cent Return on P.U.C. Valuation Less Bus Intangible
1922	$5,736,021	$7,820,139	$5,732,932	$5,732,932
1923	3,265,163	7,843,315	5,758,711	5,758,711
1924	4,055,052	7,909,172	5,831,989	5,750,247
1925	4,006,641	8,152,062	6,102,173	5,858,727
1926	5,046,933	8,635,193	6,639,827	6,132,061
1927	4,529,584	9,073,860	7,127,925	6,306,309
1928	5,602,252	9,379,738	7,476,001	6,504,390

In the first column of the accompanying tabulation is shown the operating income that Public Service actually has received, by years, through operation of its trolleys and buses, exclusive of the Public Service Railroad and interstate buses. These figures, by themselves, give no answer to the question of whether the company has been receiving a fair return upon the fair value of its properties. Using the several valuations, and bringing them down to date, the computation of earnings becomes simply a matter of mathematics.

Making the proper adjustment in the company's capital account for additions, withdrawals and retirements, and for accrued depreciation, the 7 per cent return on the basis of Judge Haight's decision has been figured out. This is shown in the second column of the tabulation. This exceeds by from $2,000,000 to nearly $4,000,000 the actual operating income of the company in the seven years examined.

If the original valuation made by the Public Utility Commission, which was $82,000,000 in 1921, be used as a rate base, with proper changes year by year, the 7 per cent return would be as shown in the third column. For the year 1922 this amount was virtually equal to the actual operating income. For each succeeding year it will be noted the deficiency in income has been greater. Even on this low basis the deficiency for 1928 was approximately $1,800,000.

Still another computation has been made, with deductions for the so-called intangible value of buses. It was the practice of the company, up to 1928, to divide the cost of buses between tangible and intangible value. The tangible value represented what the company believed the bus to be worth, while the balance between that and the price actually paid represented the intangible value. This intangible value, by years, has been between $2,000,000 and $4,500,000. Making a computation of earnings of 7 per cent upon the board's base valuation of 1921, with deductions for "intangible bus value," the figures given in the last column are obtained. Even using this basis, there is a deficiency in earnings in every year except 1922, varying between about $1,000,000 and $2,500,000.

Summarized, a 7 per cent return upon Judge Haight's valuation made in 1921 would total $58,813,483 for the period 1922-28. The total upon the board's valuation with inclusion of bus intangibles would be $44,669,562. With exclusion of all intangible bus values, the total for the period would be $42,043,380. The operating income of the company during that period has been $32,241,649.

Chicago Suburban Line Sold Under Foreclosure

The Hammond, Whiting & East Chicago Railway was sold at auction on Dec. 26 to a syndicate of business men headed by Morse DellPlain, president of the Northern Indiana Public Service Company. The sale was conducted by Ernest Force, special master in chancery, who acted under a decree of Federal Judge Slick. The sale price was $300,000.

A mortgage of $1,788,000 had previously been foreclosed on the property. The sale was approved on Dec. 28 by Judge Slick.

According to present plans the recently organized Calumet Railways, Inc., will take over the property. The Calumet Railways, Inc., seeks to obtain franchises from the three cities involved. If it is successful in doing this, the Insull organization will provide money for rehabilitation.

Ohio Interurban Sells Its Power Lines

Sale of all its power lines and poles, and the rights-of-way for such lines to the Ohio Edison Company, Springfield, Ohio, was announced on Dec. 26 by the Cincinnati & Lake Erie Railroad, the through electric railway system formed by the merger of the lines of the Cincinnati, Hamilton & Dayton Railway, the Indiana, Columbus & Eastern, and the Lima-Toledo Railway lines recently. The sale price was $350,000. Coincident with the announcement of the sale, the company also revealed that it was entering into a contract with the Springfield company whereby, in the future, the Ohio Edison Company will supply all of the power for the railway lines.

Program of Transportation Men Takes Shape

The meeting of the executive committee of the Transportation and Traffic Association held at the office of C. H. Evenson at Chicago on Dec. 10, 1929, was devoted largely to consideration of the program for the San Francisco convention in June. A letter of George B. Anderson, chairman of the program committee, announced tentative choice of speakers for the meeting and outlined the program for the three-day session. It was the opinion of those present that in the future fewer luncheon conferences should be held and that no subjects under study by the association committees should be chosen as topics for the luncheon meetings. President Samuel Riddle announced the completion of the membership of all committees.

The secretary was instructed to bring to the attention of the Accountants' executive committee the cost analysis methods set forth in the 1928 report of the committee on bus operation, and the 1929 report of the committee on the equipment and suggest the desirability of collaboration between the Accountants' and the Transportation and Traffic Associations in completing the study of such methods.

In the matter of the nomination and election of officers by the association at its convention it was decided that the election should take place at either the first or the second meeting rather than at the last session as is the present practice.

C. W. Wilson of the committee on the movement of the vehicle was instructed to elaborate to some extent on the work done by the previous committee and to give particular attention to the studies for the purpose of making recommendations on suitable parking regulations under various conditions. The committee was also instructed to study automobile registration in cities and its effect upon public transportation. W. W. Holden, chairman of the committee on "the passenger," said the work of his committee would depend largely on whether the employment of a specialist was authorized by the executive committee. The committee wanted to employ a well-known authority for making analyses in a selected group of cities, and unless this can be provided for, it will be necessary for the members of the committee to conduct the investigation only in the communities in which they reside.

A. C. Spurr, who is chairman of the committee on the "small city," stated that a sub-committee on procedure had been appointed and that this year special attention would be given to the subject of return on new capital invested and the results obtained with various fare systems in use. Committee members are to furnish data for their own properties and in addition each will visit several other properties to obtain such information as is available.

C. D. Smith, chairman of the committee on the transportation employee, said that this committee will give special attention to the subject of training from the standpoint of accident prevention, including the conference training method, job analysis, etc.

It was agreed to accept the invitation of Mr. Holden to hold a meeting in San Antonio on March 3, 1930.

NEWS BRIEFS

Continued from Page 54

South Bend, Ind.—Steadily increasing patronage has unqualifiedly approved the operation of Chicago, South Shore & South Bend Railroad de luxe trains. Reports show that the traveling public indorses the operation of parlor cars on dining car trains, for parlor car patronage on de luxe trains has increased from month to month since the line instituted this service last July.

✦

Trenton, N. J.—The Trenton Transit Company has been organized as the successor to the Trenton & Mercer County Traction Corporation. The new company really represents the consolidation of the railway with its former bus subsidiary, the Central Transportation Company.

✦

Allentown, Pa. — A bill for foreclosure of the first mortgage of $150,000 on the property of the Bethlehem & Nazareth Passenger Railway has been filed in the United States District Court at Philadelphia by the Guaranty Trust Company, New York, trustee for the bondholders. The bill was filed because the company defaulted in payment of bonds which matured May 1, 1929. The railway is being operated under lease by the Lehigh Valley Transit Company.

✦

Chicago, Ill.—The Illinois Commerce Commission on Dec. 18 approved the issuance by the Chicago, North Shore & Milwaukee Railroad of $700,000 Series G equipment trust certificates partially to cover the cost of 25 additional all-steel motor cars, delivery of which is to start on Feb. 1. It also approved the issuance of $522,000 first and refunding mortgage 5½ per cent bonds to reimburse the company treasury for expenditures made in the latter part of 1929 for improvements.

✦

New Orleans, La.—Racing fans desiring quick and efficient transportation to the tracks this season are invited to use the service of the Orleans-Kenner Traction Company, Inc., which is one of the quickest in the city and has an added advantage in that its cars stop only a few feet from the grandstand entrance of the race track. L. J. D'Aubiu, general superintendent of the Orleans-Kenner Traction Company, has made the most of this, realizing that patrons want speedy, efficient and comfortable service, which the company renders.

✦

Hampton, Va—Norman E. Drexler, general manager of the Public Service Company, has asked the Hampton City Council for permission to substitute buses for trolley cars on the east Hampton line.

✦

Jamestown, N. Y.—The Jamestown Motor Bus Transportation Company, a subsidiary of the Jamestown Street Railway, plans to extend its Fairmount Avenue line from the present terminus in Lakewood, N. Y., to the village of Ashville, making the one-way distance of that line 9 miles, instead of 6 as at present. The Jamestown Street Railway will continue its service between Jamestown and Ashville, the bus line being intended to augment the trolley service.

Portsmouth, Ohio—The Public Utilities Commission has authorized the Portsmouth Public Service Company to abandon service for a period of one year over its interurban line between Portsmouth and Ironton. The abandonment will be effective after 30 days notice to the public.

✦

Springfield, Mass. — A through bus service from Springfield to Boston, Mass., is to be started about Jan. 8 by the Springfield Street Railway in conjunction with the Worcester Consolidated and the Boston, Worcester & New York companies. Three round trips daily are proposed. This service is in addition to buses already in operation by the same agencies and will follow routes already authorized by state and municipal authorities, with the exception of a minor change in Springfield.

✦

San Diego, Cal.—The San Diego Electric Railway has notified the Councils of San Diego and National City that it has applied to the Railroad Commission for authority to abandon its lines and to remove the tracks from 32nd Street and Newton Avenue, San Diego, and thence on a private right-of-way to Dalbergia Street and National Avenue, thence on National Avenue along the pike to National City, thence on National Avenue to Twelfth Street and on Twelfth Street, National City, to a junction with the San Diego & Arizona Railroad. The company recently acquired the Sutherland Stages operating between National City and San Diego.

✦

Brooklyn, N. Y.—Irving Lee Bloch, vice-president of the Long Island Title & Guarantee Company, suggests the building of a four-track subway underneath the Atlantic Avenue route of the Long Island Railroad, the tearing down of the existing railroad tracks and the rebuilding of Atlantic Avenue into a motor parkway with direct egress from Jamaica, and the connection of such a Jamaica-Brooklyn subway system at the existing Flatbush Avenue terminal with the existing systems leading to other parts of Brooklyn and Manhattan.

✦

Kansas City, Mo.—Due to the Kansas City election and delay in the state valuation of the Kansas City Public Service Company, the street car fare issue before the Public Service Commission is about to be continued into April. The company has a 10-cent fare schedule on file at Jefferson City and the last six-month suspension ordered by the commission expires on Jan. 12. The Missouri statutes permit the commission to suspend a filed schedule twice before it must be denied or affirmed. Valuation will probably be completed in February.

✦

St. Louis, Mo. — The General Cab Company of Kansas City, and Los Angeles, Cal., on Jan. 4 will begin operations in St. Louis with a fleet of 54 Ford taxicabs. The fare will be 10 cents for flag pull and 10 cents for each additional half-mile compared with a 25-cent flag pull and 10 cents for each two-fifths of a mile charged by other companies in the St. Louis field. The new taxicab company plans to increase its fleet to 100 cars within a very few months.

Receivers for Albany, Syracuse and Rochester Lines

Federal Judge Frederick H. Bryant, at Malone, N. Y., on Dec. 28 appointed receivers for the United Traction Company of Albany, Troy and Cohoes, and for the New York State Railways, serving Rochester, Syracuse and Utica and owning lines running between Rochester and Little Falls.

Harry Weatherwax and Neil F. Towner, both of Albany, were named receivers for the United Traction, while Benjamin E. Tilton of Utica, and Wallace Pierce of Plattsburgh were named receivers for the New York State Railways.

The receivership was forced by an action of the General Finance Company, which alleged that United Traction owed about $195,000 on one note and $3,500,000 on another. The company also had some miscellaneous debts, it was stated, amounting to about $100,000. There was a mortgage of $420,000 due on Jan. 1 and some miscellaneous interest. The United Traction is said to have an accumulated deficit of about $10,000,000. Earnings for the last year were represented by counsel for the plaintiff as showing a deficit of more than $600,000. The allegation also asserted that the company had defaulted interest amounting to $80,000 on Nov. 1.

The Finance Company stated that the New York State Railways owed about $400,000 on open accounts and about $260,000 on labor claims and taxes.

Robert C. Watson, president of the Rochester Trust & Safe Deposit Company and member of the protective committee formed by bondholders of the Rochester Railway, which was taken over by the New York State Railways, characterized the receivership as a "smart move by the management of the railway lines to gain more time" and he said that the activities of the protective committee will be pressed with the greatest vigor. He said that he would make no attempt to interpret the legal phases of the receivership, but he viewed it as another means of "intimidating the bondholders to accept an unreasonable and unfair offer of conversion of their securities into those of the Association Gas & Electric Company." He is said to have charged that the attitude of the present management of the railways toward the bondholders shows that they are "wreckers, not builders."

J. H. Pardee, chairman of the New York State Railways, has sent a letter to the bondholders of the Rochester Railway outlining the status of the holders under the terms of the mortgages covering that property. The statement is technical and mostly of direct interest to the actual holders of the securities, but the following excerpt is of general interest:

"The service-at-cost plan expires on July 31 next. The plan provided that, if it were to be extended, notice of extension should be filed one year before the expiration date. No notice of extension was given and so far as we know there is no assurance on the part of the city of Rochester that it will extend the service-at-cost plan for any further period. If it is not extended and the Quimby decision upholding a 5-cent fare is held binding, the situation will be serious. We have had a statement made up showing the 5-cent fare applied to the number of revenue passengers carried for the year ended October, 1929, to see what the income statement would be if that fare had been in effect throughout the twelve-month period, with these results:

Operating expenses, maintenance, depreciation and taxes	$3,920,817
Operating revenue, other income	2,775,758
Operating loss before provision for bond interest	1,145,059

"The erroneous impression also seems to prevail that the Rochester Railway lines can be seized by the Rochester Railway first and second mortgage bondholders and operated independently of the New York State Railways. This cannot be done since substantial amounts of the equipment, as well as other property necessary for operation in Rochester, is subject to the first lien of our consolidated mortgage."

Under date of Dec. 21, 1929, H. C. Hopson, president of the Associated Gas & Electric Securities Company, which made an offer of exchange to bondholders, issued a statement in which he referred to the dangers of receivership. After reviewing briefly the history of the electric railway Mr. Hopson says that "most astute bankers and able students have for years worried about its future and greatly doubted its ability to survive. It came to be true some time ago that no well-informed person willingly invested a dollar in street railway securities unless he got the best security available at the time, and then only on a basis which he thought would compensate him for the risk being taken."

It seems that the Associated Gas & Electric System did not want the transportation system; that in fact it "unavoidably became the largest security holders of the traction system." Mr. Hopson says:

"As a result of acquisitions of electric and gas properties a few months ago, our interests also unavoidably became the largest security holder of the traction system in which you are a bondholder. We did not value our interest at much, if anything, but on the other hand our predecessors with less experience in the industry than ourselves had hope for it. Their advisors and the operators in charge of the properties were still optimistic that something might come about or be done to change the course of events. * * * It is obvious that those who have purchased securities of an interprise which is primarily engaged in the light and power business cannot be expected to be willing to have their money invested in another industry about which most investors feel decidedly pessimistic."

Later the offer of exchange for Albany Railway 5's was made 90 per cent of the face value instead of 40 per cent. Circulars to Albany Railway holders explained the change by saying that since the offer of 40 was made, "we have made a more extensive investigation of the operations of the company and of the value of the real estate subject to the lien of the mortgage securing the bonds which you hold." The new offer is made retroactive.

Conspectus of Indexes for December, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years High	Last Five Years Low
Street Railway Fares* 1913 = 4.84	Dec., 1929 **7.78**	Nov., 1929 **7.78**	Dec., 1928 **7.71**	Nov., 1929 **7.78**	Nov., 1924 **7.24**
Electric Railway Materials* 1913 = 100	Dec., 1929 **144.9**	Nov., 1929 **145.7**	Dec., 1928 **145.5**	Dec., 1926 **159.2**	Feb., 1928 **139.5**
Electric Railway Wages* 1913 = 100	Dec., 1929 **231.1**	Nov., 1929 **231.1**	Dec., 1928 **229.8**	Nov., 1929 **231.1**	Dec., 1924 **220.8**
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	Dec., 1929 **205.1**	Nov., 1929 **204.8**	Dec., 1928 **205.1**	Nov., 1928 **205.7**	July, 1929 **199.0**
General Construction Cost Eng'g News-Record 1913 = 100	Dec., 1929 **209.5**	Nov., 1929 **208.5**	Dec., 1928 **210.2**	Jan., 1927 **211.5**	Nov., 1927 **202.0**
Wholesale Commodities U. S. Bur. Labor Stat. 1926 = 100	Nov., 1929 **94.4**	Oct., 1929 **96.3**	Nov., 1928 **96.7**	Nov., 1925 **104.5**	Apr., 1927 **93.7**
Wholesale Commodities Bradstreet 1913 = 9.21	Dec., 1929 **12.24**	Nov., 1929 **12.40**	Dec., 1928 **13.15**	Dec., 1925 **14.41**	Dec., 1929 **12.24**
Retail Food U. S. Bur. Labor Stat. 1913 = 100	Nov., 1929 **157.9**	Oct., 1929 **160.5**	Nov., 1928 **157.3**	Nov., 1925 **167.1**	Apr., 1925 **150.8**
Cost of Living Nat. Ind. Conf. Board 1914 = 100	Nov., 1929 **163.0**	Oct., 1929 **163.4**	Nov., 1928 **162.6**	Nov., 1925 **171.8**	Apr., 1929 **159.3**
Industrial Activity Elec. World, kw.-hr. 1923–25 = 100	Nov., 1929 **122.9**	Oct., 1929 **134.6**	Nov., 1928 **135.0**	Feb., 1929 **140.4**	Aug., 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	Nov., 1929 **111.2**	Oct., 1929 **111.8**	Nov., 1928 **104.0**	Oct., 1929 **111.8**	Dec., 1924 **90.07**
Business Failures Number	Nov., 1929 1536	Oct., 1929 1511	Nov., 1928 1568	July, 1929 1581	Sept., 1928 1348
Liabilities, Millions of Dollars	**53.86**	**29.51**	**54.23**	**102.09**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Another Hearing on Rochester-Buffalo Service

Opposition on the part of the International Railway and the Buffalo Transit Company, Buffalo, to the application of the Rochester, Niagara Falls & Buffalo Coach Lines, Inc., for a certificate to operate buses between Rochester and Buffalo has prompted the Public Service Commission to adjourn the hearing again until Jan. 20.

Much of the testimony taken by Commissioner Pooley at the first adjourned hearing held in Buffalo centered about losses that the International Railway would sustain should it be deprived of the interchange of traffic with the Rochester, Lockport & Buffalo trolley line at Lockport. The Buffalo Transit Company, which now operates buses between Lockport and Buffalo, wants the Rochester, Niagara Falls & Buffalo Coach Lines, Inc., restricted from carrying local passengers in territory now covered by its bus system.

The capitalization of the proposed new bus line is $100,000. Authority is asked by the Rochester, Lockport & Buffalo Railway for permission to acquire the entire capital stock.

Substitution in Fishkill

The Public Service Commission has granted a petition by the Fishkill Electric Railway to substitute buses for trolley cars on part of its system in Beacon, N. Y., the city consenting to the substitution. Operation of trolley cars between Beacon and Fishkill will be continued. It is the intention of the company to supplement the bus operation by trolley cars when necessary, especially in the summer season. The company plans to put five buses in operation. The substitution, it is stated, will make for freer movements in the streets and a seven-minute headway, in place of the present ten-minute headway will be placed in operation. There will be no change in the existing fares, nor lessening of the number of scheduled trips.

Electric Railways Eliminated from Grade Crossing Removal Costs

The special commission created by the Legislature of Massachusetts to investigate the abolition of grade crossings has filed its final report with the General Court. The report recommends the establishment of an entirely new method for the abolition of such crossings. In brief, the special commission would give entire control of the work to the State through the Public Utilities Commission. A second innovation would be in the apportionment of the cost, which a majority believes should be so distributed that the state would pay 35 to 40 per cent, the railroad 50 per cent, the city and town not less than 5 per cent or more than 10 per cent, while the county may be assessed from nothing to a maximum of 10 per cent.

The report recommends the elimination of the electric railways from the cost assessments. It says:

"Because of the financial condition of the electric railways of the state, their decreasing revenues from rail service and the rapid trend toward bus service, these corporations have been eliminated from sharing in the costs, except under the voluntary agreement section. The electric railways will, however, pay for any changes in rails, poles or wires made necessary through change of grade or location due to the abolition of a grade crossing."

Rehearing Asked in Los Angeles Case

The City of Los Angeles and the California Railroad Commission on Dec. 23 appealed to the United States Supreme Court for a rehearing of the case in which the high court upheld a fare increase from 5 to 7 cents.

Early in December the Supreme Court handed down a decision granting the Los Angeles Railway the fare increase. A federal order previously had put the 7-cent fare into effect pending settlement of the suit. In petitioning for a rehearing of the case, the joint petition filed with the high court alleges the court erred in its decision on three grounds:

1. In holding that the city did not have power to prescribe franchise rates.
2. In not holding that the franchise rates would be binding to the railway if the California law was silent on the subject.
3. In holding that the California Railroad Commission had assumed jurisdiction over fares in 1921 and 1928.

The petitioners asserted that the court's decision "is constantly unsound and at direct variance with many decisions of it and other courts referred to in the brief of appellant."

The "Home Telephone case," relied upon in the court's majority opinion, is not applicable to the fare case, the petitioners contend. In that case it was held that the city did not have continuing power to regulate phone rates by prescribing rates in a charter, it was stated. The Los Angeles Railway filed its objection to a rehearing a few hours after the city-state petition was lodged with the court.

Justices Brandeis, Holmes and Stone dissented when the high court handed down its six-to-three opinion on Dec. 2. Justice Butler delivered the majority opinion. Both sides in the case are said to have admitted a 5-cent fare was not compensatory. The minority dissenting opinion stated that the high court exceeded its powers in interpreting the law of California as to whether the city had the right to contract for a fixed 5-cent fare.

Feeder Bus Controversy Settlement Ahead in Chicago

The controversy over the operation of feeder buses by the Surface Lines in Chicago's outlying districts, especially on the northwest side, may come to an end on Jan. 7 after two years of dispute. On that day a committee of Chicago Aldermen will appear before the Illinois Commerce Commission with a petition for more than 90 miles of routes. All indications are that their plea will be treated favorably. This would provide residents of the northwest side with a 7-cent feeder bus fare, with railway transfer privileges, as against the Chicago Motor Coach company's 10-cent fare without transfers.

After everything seemed well on the way to settlement, it became known on Dec. 30 that the Surface Lines plan to go before the commission on Jan. 14 with a request for authority to operate trolley buses on Diversey Avenue and motor buses on Belmont Avenue. Whether or not other service is contemplated is not known. In order to run the trolley buses the company must satisfy the city and the commission that this new type of transportation will be adequate, efficient and economical. Since the north side lines are in receivership, Federal Judge Wilkerson is in a position to prevent the lines from spending more money should the security holders take action.

Morgan Report Awaited at Detroit

A report showing that the Detroit Municipal Railway is being operated at a loss, despite the monthly financial statements indicating a profit, has been prepared by John H. Morgan, auditor, says the *Free Press*.

As Mr. Morgan explained the matter, he had made a report on questions raised by Senator Couzens and transmitted to him by Frank Couzens, member of the Street Railway Commission. He also said that he had completed a report on railway department insurance, and was working out a plan for figuring the depreciation on the equipment of the system.

As Mayor of Detroit in 1921 Senator James Couzens brought about the consolidation of all lines under city management. Since then he has shown a keen interest in the manner in which the system operated. The appointment of his son, Frank, to the Detroit Street Railway Commission, followed closely the primary election in October and the resignation of G. Ogden Ellis, who had served for many years as chairman.

Mr. Morgan stated in a meeting a few weeks ago that not one bus line was earning money. It is expected that the Morgan report will become an active issue just as soon as Mayor-Elect Charles Bowles takes office on Jan. 14.

New Edition of Engineering Manual Ready Soon

The 1929 edition of the Engineering Manual, which is the electric railway man's handbook of standards, recommended specifications, designs, methods, etc., and miscellaneous methods and practices that have been approved by the American Electric Railway Engineering Association, is in preparation.

It is very desirable that all users of the Engineering Manual obtain the 1929 issue, so that errors will not be made in using specifications that have been revised, withdrawn or superseded. Even when accompanied by the 1927 and 1928 supplements the 1926 edition cannot be brought up-to-date, since the revised and added material approved during 1929 would not be included. All new material from the past year in the new edition of the Manual has been printed there without first appearing in any supplements.

Several months ago association headquarters distributed an order blank to every operating member company. In addition, every holder of the 1926 edition will receive a separate letter, calling attention to the new edition. Others who desire the Manual may address their requests to association headquarters.

No price on the new edition has been definitely set, but it is probable that the cost will not change from that for the 1926 edition, i.e., $7.50 per copy to members and $10 to non-members.

PERSONAL MENTION

B. E. Tilton President of New York State Railways

Succeeds James F. Hamilton as Chief Executive at Rochester. E. K. Miles Manager in Syracuse. Many Other Changes on Central New York Systems

IMPORTANT changes in the executive personnel of the New York State Railways, made necessary by the resignation of James F. Hamilton as president, have been announced. Mr. Hamilton leaves the electric railway industry to become head of a large aircraft combine, the Aviation Corporation of America.

Benjamin E. Tilton, Syracuse, first vice-president, succeeds Mr. Hamilton as president.

H. B. Weatherwax, for many years vice-president of the United Traction Company, operating in the Capitol district, becomes president of the United Traction Company and the Schenectady Railway, posts formerly held by Mr. Hamilton.

Ernest Murphy, general manager of the United Company, will continue in that capacity, taking in addition the position of general manager of the Schenectady company.

Roy R. Hadsell, in charge of operations of the Schenectady company, becomes manager of that system and Ernest K. Miles, superintendent of transportation at Syracuse, will be appointed general manager of the Syracuse lines.

John F. Uffert, general superintendent of transportation and equipment of the Rochester lines, becomes general manager of the system in that city.

J. N. Jones, superintendent of transportation at Utica, is promoted to be general manager there. Howard L. Reichart, secretary-treasurer, and Joseph M. Joel, general auditor of the group, remain in the same positions.

Headquarters of the New York State Railways will remain in Rochester.

Besides being president of the New York State Railways, Mr. Hamilton was president and a director of eighteen subsidiary bus and railway companies, all controlled by the Associated Gas & Electric Company, with headquarters in New York.

William F. Stanton, assistant to Mr. Hamilton, will go with his chief to the new post.

Mr. Hamilton, now in his 52d year, began his career in the electric railway field as a motorman on the International Railway lines in Buffalo. He went to Rochester in 1917. Previously he was assistant superintendent of the Schenectady Railway, rising to the presidency in 1909. In 1911 he became general superintendent of the United Traction Company of Albany and in the following year general manager of both the United and Schenectady lines. He went to the New York State Railways as general manager. In 1918 he was made vice-president and assumed the presidency a few months later.

During his regime, the service-at-cost contract was negotiated between the city of Rochester and the railways. This grant has been in effect for the past ten years.

It was said of Mr. Tilton as far back as 1922 that no task is ever likely to master



B. E. Tilton

him that can be accomplished by the application of a combination of tact, tenacity and technology. Mr. Tilton brought all three of these adjuncts to bear on his first job down in Porto Rico with the government service making geodetic and coast surveys and he has been using the combination with success ever since. And with every new application of them by Mr. Tilton has come added ease in their use and greater success to their possessor through their application.

The government work in Porto Rico was Mr. Tilton's first job after he was graduated from Cornell in 1897. He was in Porto Rico for three years. And then came to Mr. Tilton the call of private enterprise. It was a loud call, and he heeded it to become engineer of construction of the Pennsylvania Lines West and was located at Fort Wayne and Cleveland for six years. At Cleveland Mr. Tilton's fine work attracted the attention of the management of the Cleveland Railway and he was induced to join the select circle of very able men who administer that property. His title there was engineer of maintenance of way. Then and there Mr. Tilton was won over to the electric railways. His next connection was with the Rochester Railway & Light Company as engineer of maintenance of way of city and suburban lines. The Rochester lines are tied in with the New York State Railways and so it was in reality only a step for Mr. Tilton in his upward climb to go from the post in Rochester to the position of general manager of the Syracuse Rapid Transit Company, Utica & Mohawk Valley Railway and the Oneida Railway. His election as vice-president followed quite logically. In this dual post at Syracuse Mr. Tilton had jurisdiction over the Oneida and the Utica lines. He is steeped in a knowledge of the history and affairs of the New York State Railways and his selection for the post of president followed just as logically as did his other promotions with the company.



J. F. Hamilton

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F. J. Tew in Another Foreign Post

F. J. Tew has resigned as superintendent of shops and equipment of the Sacramento Northern Railway, Sacramento, Cal., to accept a position with Emprezas Electricas Brasileiras, S. A., at Rio de Janeiro, Brazil, South America.

Mr. Tew received his early training in electric railway work with the Twin City Rapid Transit Company, being employed in the Snelling Avenue shops from 1904 to 1912 inclusive in various capacities in the different departments.

In November, 1912, he accepted the position of superintendent of shops and carhouses with the Manila Electric Railroad & Light Company at Manila, P. I., where he remained until 1920, at which time he returned to the United States.

Upon his arrival in California from Manila, Mr. Tew accepted the position of superintendent of shops with the Sacramento Northern Railway. At both Manila and Sacramento he was in entire charge of all mechanical and electrical shop work in connection with the maintenance of rolling stock, including city, suburban, interurban passenger and freight cars and heavy electric locomotives.

✦

C. J. Quill With North Coast Company

C. J. Quill has succeeded H. R. Leigh as superintendent of the North Coast Transportation Company, Seattle, Wash. Mr. Quill's transportation experience dates back to June, 1912, when he entered the employ of the Tacoma Railway & Power Company. He continued with this company until he enlisted for military service in 1917. Returning from military duty he re-entered the service of the Tacoma Railway & Power Company, which he served in several positions. In February, 1927, he was made general passenger agent for the North Coast Lines. On June 1, 1927, he was appointed assistant superintendent of the North Coast Lines, in which capacity he has since continued.

✦

G. S. Wills, former general manager of the Wheeling Traction Company, Wheeling, W. Va., and former general superintendent of the Steubenville, East Liverpool & Beaver Valley Traction Company, is now associated with the Pharo Engineering Company, Pittsburgh, Pa.

W. T. Rossell Vice-President of New Brooklyn System

W. T. Rossell, who has been general manager of the Pittsburgh Railways, Pittsburgh, Pa., has resigned to become vice-president of the Brooklyn & Queens Transit Corporation, Brooklyn, N. Y., which includes more than 500 miles of surface railway making up the Brooklyn City Railroad and the surface lines of the Brooklyn-Manhattan Transit Corporation.

Mr. Rossell has served as general manager at Pittsburgh since September, 1926. He succeeded F. R. Phillips in that post. He had previously been superintendent of way of the Pittsburgh Railways and general superintendent in charge of maintenance. He is another official schooled in engineering who has demonstrated his managerial ability.

The new Brooklyn vice-president was born in Memphis, Tenn., and was educated at Staten Island Academy, Staten Island, N. Y., from which he was graduated in 1904. Later he entered the United States Military Academy at West Point. In



W. T. Rossell

August, 1908, he became assistant engineer of track and structures for the Cincinnati Traction Company and the following year was connected with the York Manufacturing Company, York, Pa. In October, 1909, he returned to the Cincinnati Traction Company where he remained until 1916 when he became superintendent of track and structures for the Cincinnati, Newport & Covington Railway, operating out of Covington, Ky. Following his discharge from the army in June, 1919, as a captain of engineers, Mr. Rossell returned to the Cincinnati, Newport & Covington Railway as superintendent of way and structures, in which capacity he continued until his appointment as superintendent of way of the Pittsburgh Railways in July, 1924.

Thomas Fitzgerald, who has been vice-president of the Pittsburgh Railways, Pittsburgh, Pa., takes over in addition the title of general manager.

✦

Billy Mathewson Retires After Forty Years

Billy Mathewson of the United Electric Railway, Providence, R. I., has retired on pension. Mr. Mathewson entered the employ of the old Union Railroad in May, 1884, as a horse car driver, reporting at the Olneyville carhouse. After about five years service as a driver, he became assistant to Ellis R. Swan, superintendent at Olneyville at that time. Mr. Mathewson continued in this position until 1902, at which time he became superintendent of the Olneyville carhouse under the late Robert I. Todd, then general manager. He was superintendent of this carhouse for about fifteen years, going to the Riverside division in 1917. From Riverside Mr. Mathewson took charge of the newly established East Providence Division on March 30, 1924.

Mr. Mathewson continued there until November, 1926, when he took charge of the Mount Pleasant division upon the retirement of B. D. Sweet. He remained in the Mount Pleasant division until he retired on pension.

✦

L. E. Thorne With Gulf States Utilities

Lawrence E. Thorne, general superintendent of the Northern Texas Traction Company, will take charge of the Port Arthur division of the Gulf States Utilities Company, Fort Worth, Tex., a Stone & Webster subsidiary. Mr. Thorne studied electrical engineering at Texas Agricultural and Mechanical College. He entered the employ of the Northern Texas Traction Company in 1911 as chain man in a survey gang. He received rapid promotion and with the transfer in 1925 of General Superintendent V. W. Berry to the Virginia Power & Light Company, Mr. Thorne was made general superintendent of the local company.

✦

Messrs. Davis, Savage and Sherman With Car Company

C. E. Morgan, president, has announced a number of changes in the personnel of the Cincinnati Car Company, Cincinnati, Ohio. Lewis J. Davis has been made assistant to the president; Hugh Savage, superintendent of production, and Hugh K. Sherman, purchasing agent. The appointments as announced in an official bulletin are as follows:

L. J. Davis, assistant to the president, in charge of engineering and production, vice J. H. Elliott resigned.

Hugh Savage, superintendent of production, reporting to Mr. Davis.

C. J. Ellis, chief engineer, reporting to Mr. Davis.

H. K. Sherman, purchasing agent, in charge of the purchase of materials and supplies, as well as the handling and disposing of scrap and other materials. Mr. Sherman will also have charge of the general storeroom.

F. A. Latscha, assistant purchasing agent, reporting to Mr. Sherman.

C. F. Schnittger, general storekeeper, reporting to Mr. Sherman.

R. MacDonald, in charge of the service department.

A. L. Kasemeier continuing as vice-president, in charge of sales department.

Mr. Davis was assistant to Mr. Morgan as general manager of the Brooklyn City Railroad and, with the merging of the Brooklyn City lines with the Brooklyn-Manhattan Transit Corporation, became car engineer under William G. Gove.

Mr. Savage was formerly superintendent of equipment of the Brooklyn City Railroad, and before going to Brooklyn was superintendent of shops of the Detroit United Railway.

Mr. Sherman was purchasing agent of the Brooklyn City Railroad from Nov. 1, 1925, to July 1, 1929. Previous to that he was purchasing agent of the Michigan Electric Railway and the Michigan Railroad.

W. H. Gibson Purchasing Agent in Brooklyn

William H. Gibson has been appointed purchasing agent of the Brooklyn-Manhattan Transit system, to succeed the late Lincoln Van Cott. Mr. Gibson became connected with the Brooklyn companies in October, 1903, and advanced through the ranks in the purchasing department to his present position.

Mr. Gibson was born in Belleville, N. J., 49 years ago and after completing courses at the Belleville schools and a Newark business school he entered the employ of the Sprague Electric Company as a stock clerk. During his employment with the Sprague Company, Mr. Gibson advanced to the position of storekeeper and then accepted a similar position on the Manhattan Elevated Railway in New York City. He remained with the Manhattan "L" system for two years and then joined the staff of a hardware firm located in Manhattan.

In October, 1903, Mr. Van Cott selected Mr. Gibson to take charge of the store



W. H. Gibson

room at East New York for the Brooklyn Rapid Transit Company, predecessor to the present company. This was shortly after the consolidation of the Kings County "L" lines and the Brooklyn Union "L" lines as part of the Brooklyn Rapid Transit system. The work of converting the old "L" cars for electrical operation was then in progress at East New York and Mr. Gibson remained in charge of the storeroom there until the completion of that work.

He then spent a year on the staff of the late John F. Calderwood, general manager of the B. R. T. system at that time. Later he was appointed assistant general storekeeper for the B. R. T. system, under C. S. Waters, storekeeper. In 1906, when Mr. Waters took charge of the storerooms of the New York Municipal Railway Corporation following the signing of the dual subway contracts with the city of New York, Mr. Gibson was made general storekeeper. He was finally advanced to the position of assistant purchasing agent and general storekeeper in 1920 and continued as Mr. Van Cott's assistant until the latter's death.

✦

R. A. Pritchard, assistant superintendent of the railway at Little Rock, Ark., has been decorated with a pin denoting 25 years of service with the railway department of the Arkansas Power & Light Company. Mr. Pritchard entered the service of the railway in 1904 as conductor. Prior to that, at the age of nineteen, he went to work at a carhouse

in Knoxville, Tenn. At the time of the Spanish-American War he volunteered for service with Company F, First Alabama Infantry. He served under Gen. Fitzhugh Lee, of the 27th Corps, and helped clear the site for Miami, Fla., while the troops were there. After the close of the Spanish-American War he went to Little Rock as a conductor. In 1911 he was appointed supervisor and in 1923 was made assistant superintendent of the railway department.

✦

New Assistant to President at Richmond

I. Reid Carlisle has been appointed assistant to the president of the Virginia Electric & Power Company with headquarters in Richmond, Va., succeeding R. C. Hopkins, who was recently transferred to the Boston office of Stone & Webster. Mr. Reid assumed his duties on Dec. 9. He came to Virginia from Beaumont, Tex., where he was assistant to J. F. McLaughlin, formerly district



I. R. Carlisle

manager in that territory, and recently promoted to be vice-president of the Stone & Webster organization, with offices in Boston.

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Herman Russell Succeeds the Late Robert M. Searle

Herman Russell, for seven years executive vice-president of the Rochester Gas & Electric Corporation, Rochester, N. Y., has been named president of the company to succeed the late Robert M. Searle.

Mr. Russell, a native of Michigan, has been connected with the gas and electric corporation and its predecessor, the Rochester Railway & Light Company, for 23 years.

A graduate of the University of Michigan, he entered the public utility field with the Detroit Gas Company in 1900. Two years later he was made assistant superintendent of that company.

In 1903 he became superintendent of the gas manufacturing plant of the San Francisco Gas Company and a year later went to Cincinnati to take the post of assistant superintendent of the Cincinnati Gas & Electric Company.

For eight years, from 1906 to 1914, Mr. Russell served as assistant superintendent in Rochester, being elevated to the superintendency of the gas division in the latter year. He was appointed general manager in 1919 and was elected vice-president and director in 1922.



J. A. Davis

J. A. Davis Assistant at Norfolk

John A. Davis, Jr., who came to the Virginia Electric & Power Company in the capacity of a student engineer two years ago, has been promoted to be assistant to F. Carter Womack, manager of transportation in Norfolk, Va., in which territory service by electric railway and bus is co-ordinated. Mr. Davis left Richmond on Dec. 9 to assume his new duties. He is a native of Richmond and a graduate of the Virginia Polytechnic Institute. He joined the Stone & Webster forces in 1927. Mr. Davis formerly held the post of acting assistant to the president of the company, taking over the work of R. C. Hopkins, who was recently transferred to Boston and who on Dec. 9 was succeeded by I. Reid Carlisle.

✦

S. L. Williams Promoted by Westinghouse Air Brake

S. L. Williams has been appointed district engineer for the Eastern district of the Westinghouse Air Brake Company at New York. Mr. Williams was graduated from the Massachusetts Institute of Technology as a mechanical engineer in 1923, and immediately entered the employ of the Westinghouse Air Brake Company as special apprentice in the Wilmerding works. After serving for several months as inspector in Boston and New York, he was made assistant to the district engineer at the latter place in 1925. In 1928 he was transferred to the West Coast and promoted to be assistant district engineer of the Pacific District at San Francisco. This position he held until his recnt promotion.



S. L. Williams

OBITUARY

W. W. Briggs

Wallace W. Briggs, since 1925 vice-president in charge of operation for the Grays Harbor Railway & Light Company, Aberdeen, Wash., and also general manager and purchasing agent, died in that city on Dec. 9. His death was preceded by an immediate illness of only two days.

Mr. Briggs was well known in the West. For a number of years he was San Francisco district manager for the Westinghouse Electric & Manufacturing Company and later became general manager of the Great Western Power Company of California. In 1918 he joined the Westinghouse organization in New York and subsequently became affiliated with the Federal Light & Traction Company, which controls the Grays Harbor company. About the middle of 1925 he was sent from New York to become the operating head of the Grays Harbor property.

A genial, kindly man, he was "Wally" to all who knew him. An annual custom



W. W. Briggs

of his was to give a "Kids' Party" in the Electric Park power station grounds on his birthday to all the children of the community.

Mr. Briggs had become a very important figure in his community in the last four years, taking an active interest in civic affairs.

✦

Hugh A. Siggins, whose father, the late David Siggins, in 1892 incorporated the Warren Street Railway and the Warren & Jamestown Street Railway, Warren, Pa., died on Dec. 24 after a brief illness. With the retirement of his father from active management of the transportation lines, Mr. Siggins headed the two companies until they were sold to the Associated Gas & Electric Company several years ago. He was 52 years of age.

✦

Ormel W. Pierce, founder and president of the Railroad Trolley Guard Company, Olean, N. Y., died at his home in that city on Dec. 28, following a short illness. He was also head of the Olean Tile Manufacturing Company and was an officer of a number of other local industrial concerns. He was 63 years old.

✦

Mrs. Carrie Alexander Bahrenburg, widow of Henry Alexander, founder of the local railway at Belleville, Ill., and its operator for several years after her husband's death, died in Belleville, on Nov. 24. She was 68 years old.

INDUSTRY MARKET AND TRADE NEWS

Big Merger in Car Building Field

Plans involving an important expansion in the manufacturing activities of the Pullman company, through the acquisition by purchase of the Standard Steel Car Company and the Osgood Bradley Car Company have been announced, the entire transaction calling for an exchange of stock and cash to the amount of $50,000,000. Action on the merger will probably be confirmed at a meeting of the stockholders of Pullman, Inc., to be held in Wilmington, Del., on Jan. 28.

Standard Steel Car and Osgood Bradley Car own and operate plants manufacturing railway passenger and freight cars, street railway cars, steel forgings, gray iron castings, etc., at the following locations: Butler, Pa.; Hammond, Ind.; Baltimore; St. Paul; Richmond; Worcester; Sagamore, Mass.; Elwood City, Pa.; La Rochelle, France; and Rio de Janeiro. Besides these properties, Pullman, Inc., is acquiring sales offices in New York, Chicago, Pittsburgh, St. Paul, Baltimore, Richmond, London, Paris, Rio de Janeiro, Sao Paulo, Buenos Aires and Cape Town. The Middletown Car Company owns and operates a car assembling plant at Rio de Janeiro, while Entreprises Industrielles Charentaises owns and operates a freight and passenger car plant at La Rochelle, France, equipped to handle a general export business.

Lands and Buildings Included

In addition to the manufacturing plants and sales offices, Pullman, Inc., is acquiring certain lands, housing properties, owned by Standard Steel Car or subsidiaries. The inventories, receivables, etc., connected with the manufacturing plants are to be acquired for cash or equivalent in securities.

The properties being acquired will be operated by a newly incorporated subsidiary of Pullman, Inc., to be wholly owned by that company but to be operated separately from the Pullman's present manufacturing subsidiary, the Pullman Car & Manufacturing Corporation.

Entrance of the Mellon interests into Pullman's affairs is indicated by the election of R. K. Mellon as a director. Pittsburgh interests, including the Mellons, were largely interested in Standard Steel Car.

Freight Terminal Planned for South Bend, Ind.

The Chicago, South Shore & South Bend Railroad has acquired an 11½-acre tract in South Bend, Ind., as a site for a new freight terminal. The property was purchased in the name of the Indiana Industrial Land Company, and is adjacent to the tracks of the New York Central Railroad.

This is a further step in the improvement program begun four years ago when the present management took over the railroad. Rapid growth of carload and less-than-carload freight business in that period is the foundation for this new expansion.

The acquisition and development of this property according to plans of the line will enable the South Shore Line to offer shippers prompter and more convenient service, will eliminate the movement of freight over South Bend streets and will open up highly desirable sites for industries.

The South Shore Line will develop the site as a freight terminal and industrial site with inbound and outbound freight tracks and houses. Detailed plans for the installation of trackage and the reconditioning and construction of buildings on the property are being drawn up.

When the new terminal is completed, the South Shore Line will abandon its present freight terminal on La Salle Street east of Sycamore Street, and will discontinue the present method of handling less-than-carload freight in tractor-trailers over South Bend streets from the old freight house now located at Orange and Olive Streets.

Recent Rolling Stock Orders and Deliveries Include Thirty Units

CANADIAN as well as United States properties figured in a number of car orders and deliveries which were announced during the closing weeks of the year. The Ottawa Car & Manufacturing Company has received an order from the Hydro-Electric Power Commission of Ontario for four motor cars and one trail car for interurban service, delivery of which is to be made early in the new year. The motor cars will be of the four-motor, double-truck, double-end, one-man type, with seats for 50 passengers. Over-all length of the cars for Canadian service is to be 51 ft. 2 in.; over-all width, 8 ft. 4 in., and total weight of bodies, trucks and equipment is expected to approximate 58,000 lb.

The trail car is of the same general dimensions, with an estimated weight of 44,500 lb. Both motor and trail cars will be of

Details of Recent Rolling Stock Orders

Name of railway	Hydro Electric Power Commission of Ontario	British Columbia Electric Ry	Youngstown Municipal Railway
City and State	Windsor, Ont.	Vancouver, B. C.	Youngstown, Oh
Number of units	4	15	13
Builder of car body	Ottawa Car Mfg. Company	Canadian Car & Foundry Company	Kuhlman Car Company.
Air brakes	Westinghouse	Westinghouse	Westinghouse; pedal.
Armature bearings	Plain	Plain	Roller.
Axles	A.E.R.E.A.	A.E.R.E.A. "E-4"	Brill special.
Car signal system	Faraday	Faraday	Bus type, with cord.
Compressors	Westinghouse DH-16	Westinghouse DH-25	General Electric
Conduit	Metal	Metal	Duratube flexible
Control	Westinghouse K-35	Westinghouse K-35	Westinghouse pedal.
Couplers	Tomlinson	Car builders	Brill.
Curtain fixtures	National Lock Washer Company	Curtain Supply Company	None.
Curtain material	Pantasote	Pantasote	None.
Destination signs	Hunter	Hunter	Hunter.
Door mechanism	National Pneumatic	National Pneumatic	Interlocked; selective valve.
Doors	Folding	Folding	Folding.
Fare boxes		Cleveland	Cleveland.
Finish (paint, enamel, lacquer)	Paint	Enamel	Duco.
Floor covering		Maple	Flexolith
Gears and pinions		Tool steel	W-N drive.
Glass	¼-in. plate	Plate	Plate.
Hand brakes	Peacock	Peacock	
Hand straps			Stanchions.
Heat insulating material	½ in. cork composition		
Heaters	General Electric	General Electric	Chromalun; thermostat control.
Headlights	Crouse Hinds	Golden Glow	Ohio Brass
Headlining	Agasote	Agasote	Haskelite.
Interior trim	Birch, cherry stained	Birch	Haskelite and wood, walnut finish.
Journal bearings	Plain	*Plain	Plain
Journal boxes		Car builders	Standard.
Lamp fixtures	Dome	Electric Service Supplies Company	Ivanhoe.
Motors	Four Westinghouse	Four Westinghouse No. 510 A	Four Westinghouse 35 hp.
Painting scheme		Red; cream trim	Brown and cream.
Registers	None		Ohmer.
Roof type	Arch	Arch	Arch.
Roof material	Basswood, canvas covered	Steel and wood; canvas covered	Wood; canvas covered
Safety car devices			
Sash fixtures		O. M. Edwards	O. M. Edwards.
Seats	Heywood-Wakefield	Car builders	Brill 210C.
Seat spacing	33 in.	30 in.	29½ in.
Seating material	Plush	Leather	Brown Spanish leather.
Slack adjusters	Westinghouse	American automatic	
Steps	Folding	Folding	Stationary.
Step treads	Universal	Irving	Kass Safety.
Trolley	Ohio Brass, No. 13119	Earll retrievers	Ohio Brass.
Trolley base	Ohio Brass	Ohio Brass	Ohio Brass.
Trolley wheels	Ohio Brass, 5-in.	Ohio Brass 5 in.	Ohio Brass.
Trucks	Baldwin	Car builders	Brill No. 177 E-1-X.
Ventilators	Nichols Lintern	Nichols Lintern	Brill standard.
Wheels, type	Rolled steel, 33 in.	Rolled steel, 26 in.	Rolled steel 22 in.
Wheelguards or fenders	Pilot	Wheel guards	H-B tray type life guard.

*One car with SKF bearings.

semi-steel construction, with end doors and arch roof.

The Canadian Car & Foundry Company, of Montreal, recently delivered to the British Columbia Electric Railway fifteen one-man two-man, single-end, double-truck motor cars for city service in Vancouver, B. C. The cars, which are of the pay-as-you-pass type, with single treadle exit door at center and at rear end, are of all-steel construction, with the exception of some members, which are made of duralumin to save weight. Over-all length is 46 ft. 2 in., and total weight is about 38,000 lb. Arch roof construction is employed.

The Youngstown Municipal Railway has placed an order with the Kuhlman Car Company, Cleveland, for thirteen one-man, double-end, double-truck motor cars for city service in Youngstown, delivery of which is to be made Feb. 1. Steel, wood and aluminum are used in the body construction, and it is expected that the total weight will be held down to 28,000 lb. There will be end doors and arch roofs. Length over all is 40 ft. 6 in., with length over the body posts of 26 ft. 5 in. Bolster centers are 17 ft. 2 in., and truck wheelbase is 5 ft., 1 in. Brakes are of the Westinghouse foot pedal, variable load type, with automotive-type hand brake.

Outside finish will be of Duco, with enamel used for interior finish and trim. Vestibule windows will be of non-shatterable glass. Door mechanism is interlocked, with selective valve control. Cars will be driven by four 35-hp. Westinghouse motors, with WN drive.

The J. G. Brill Company announces that it has received an order from the Delaware Electric Power Company, Wilmington, for twelve more cars similar in type to the two previous orders of ten cars each, which were delivered late in 1928 and during the summer of 1929. The cars were described in detail in the ELECTRIC RAILWAY JOURNAL of Dec. 15, 1928.

Equipment specifications on a number of the recent purchases are set forth in the accompanying table.

Bus Manufacturers Close Year with L

FOR extension of existing facilities and for replacement purposes, orders and deliveries of a considerable number of buses have been recorded lately by electric railways and their subsidiaries.

The Brooklyn Bus Corporation, subsidiary of the Brooklyn & Queens Transit Corporation, has received ten Twin Coaches, twelve ACF metropolitan type coaches, and two Yellow 38-passenger buses, a number of which have been placed in service on the Manhattan Bridge route, pending the granting of further operating rights by the city of New York. The Los Angeles Motor Bus Company, operated jointly by the Los Angeles Railway and the Pacific Electric Railway, has received twelve Twin Coaches of the urban type, bringing its total number of vehicles of this type to 26. Other recent deliveries of Twin Coaches include ten to the Northern Texas Traction Company, of Fort Worth, five to the San Diego Electric Railway, and one to the Portland Electric Power Company, all of the urban type, seating 40 passengers. The Twin Coach Corporation has also delivered six trackless trolleys to the Utah Light & Traction Company for service in Salt Lake City, and one rail street car of 52-passenger capacity to the Brooklyn & Queens Transit Corporation for trial operation.

A notable recent installation is that of the North Coast Transportation Company, one of the Stone & Webster transportation lines operating out of Seattle, which has received four 37-passenger parlor observation coaches, mounted on ACF 264-in. wheelbase chassis and equipped with 175-hp. Hall-Scott engines. The same company has also received two 37-passenger parlor car coaches, mounted on the new ACF 240-in. wheelbase chassis and equipped with 120-hp. Hall-Scott engines. Other deliveries of ACF equipment include two 23-passenger urban coaches to Pioneer Transportation, Inc., two 33-passenger urban coaches to the Interstate Street Railway, of Attleboro, Mass., and one 40-passenger, all-steel metropolitan type coach each to the Portland Electric Power Company, the San Diego Electric Railway, and the New Orleans Public Service Company.

International Motor Truck Corporation reports the delivery of Mack buses to the following electric railway companies: four six-cylinder, 25-passenger parlor car buses to the Cincinnati Street Railway, one four-cylinder 29-passenger city type bus to the Denver Tramway Company, and one four-cylinder 177-in. chassis to the Peoples' Motor Coach Company, of Indianapolis, the last named being a subsidiary of the Indianapolis Street Railway. Orders for Mack buses are also reported from the Lehigh Valley Transit Company and the Cincinnati Street Railway, which is adding ten 29-passenger city type buses, powered with six-cylinder engines, to its fleet.

General Motors Truck Company reports delivery of one Type W city service bus to the Springfield Traction Company, Springfield, Mo.; three Type W observation buses to the Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa; two Type W city service buses to the Oklahoma Railway, Oklahoma City; one Type Z 29-passenger bus to the Cumberland & Westernport Transportation Company, Cumberland, Md.; and six buses to the Georgia Power Company. Public Service Co-ordinated Transport has taken delivery of ten 38-passenger Yellow coaches, mounted with Lang bodies. The Fifth Avenue Coach Company, of New York, has placed an order with the General Motors Truck Company for 100 Type Z 225 chassis, for double deck bodies. These buses are being ordered to replace obsolete equipment, and delivery is to start early in the year.

Alliance System Being Improved

A moving picture camera is being used by C. E. Sperow, general manager of the Stark Electric Railroad, Alliance, Ohio, to record improvements being made over the division. Wherever new work is being done Mr. Sperow is on hand to record its various phases. These records are kept for future reference.

The Stark Electric is completing its 1929 rehabilitation program which includes considerable work over the 35-mile link. Two concrete spans have been replaced with steel bridges. Ten thousand new ties were installed. There was a similar number of new ties last year, while the 1930 program calls for 15,000.

New overhead wires were placed on most of the line in Alliance. About half a mile of 100-lb. rails was installed with thermit-weld joints throughout. In the business district, sections of old rail were replaced with new rails, all joints being welded.

In addition to this work, the company constructed a new track on Liberty Avenue while this street was being repaved by the city.

Converter Substations for Wilkes-Barre

The Wilkes-Barre Railway, Wilkes-Barre, Pa., recently changed its policy of generating its own electrical energy and now intends to purchase power from three local power companies. The power companies will supply power to eight new synchronous converter substations, equipments being built by the Westinghouse Electric & Manufacturing Company.

There will be six 750-kw. synchronous converter substations and two 500-kw. converter substations. Two of the 750-kw. stations and one 500-kw. station will be for automatic operation, while the others will be the manually controlled type.

All of the synchronous converters will be of the shunt wound type. They will operate in conjunction with transformers having 8 per cent reactance. This type of machine was specified by the purchaser to obtain superior voltage and power factor characteristics, and also to afford stability to the substations while operating together on a common feeder network.

Signal Equipment Being Installed on Gary Railways

Work of modernizing the signal equipment of Gary Railways, Gary, Ind., which has been in progress for more than a year, is proceeding apace. The cost of the 96 block signals alone will be approximately $65,000, and the cost of wire and labor will amount to an additional $35,000. The most recent installations have been between Valparaiso and Woodville. When the Valparaiso division is finished there will remain only the Crown Point and Hobart divisions. Signals for these sections have been ordered and work will get under way shortly after the first of the year.

Improving Winnipeg

Track improvements involving a total expenditure of over $340,000 have been made during the past year by the Winnipeg Electric Company.

The biggest item was the Main Street trackage, where double tracks were laid inside the old tracks, thus allowing more space at the sides for other vehicular traffic. This work cost $135,000. The track is 115-lb. steel laid on steel ties. The steel tie was used for the first time in Winnipeg. Elastite filler alongside the rail to absorb shock, and thermit-welded joints were two of the modern devices in track construction used.

Double track extension on Stafford, from Grosvenor to Lorette, cost $104,400, and meant laying 3,000 ft. of new double track. The extension on Corydon, from Lilac to Wilton, was 2,900 ft., and cost $81,760.

A single track extension of 2,000 ft. from Midland to Worth on Notre Dame Avenue cost $10,615.



1930

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Cities Service Grease Guns.

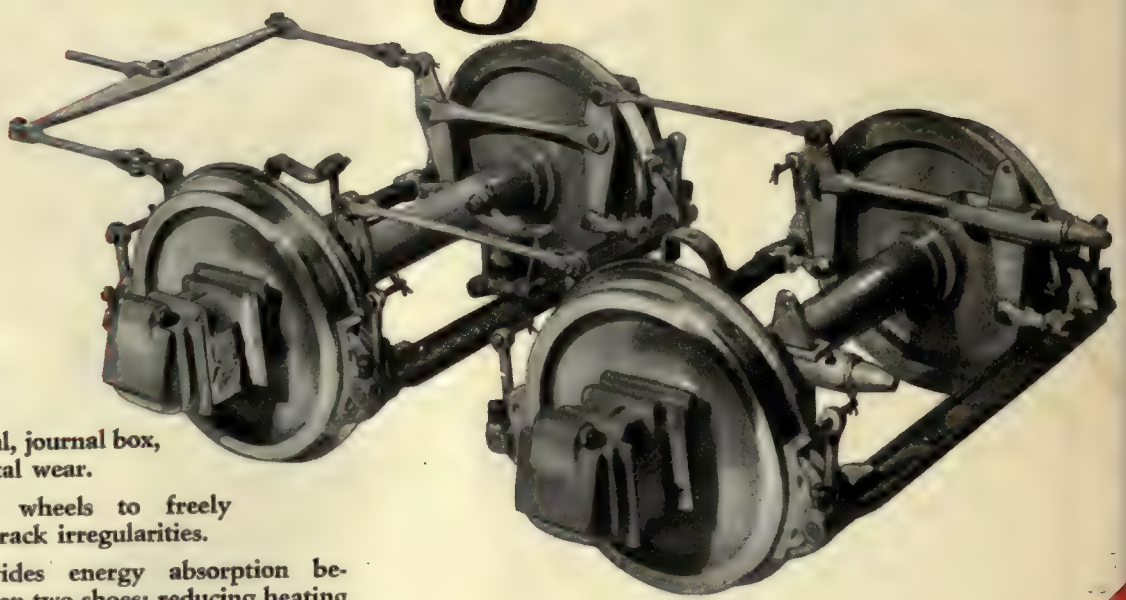
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Simplex Multiple Unit Clasp Brakes

Speed is today's byword. Greater Speed, faster service, better schedules—these are the demands on practically every transportation organization today.

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Simplex Multiple Unit Clasp Brakes offer today's method of braking to meet today's demands in speed. Two brake shoes per wheel *double* the braking area and *halve* the wear on braking equipment.

Balanced braking has *many* advantages. Study the features outlined here. Details and blueprints will be sent at your request.

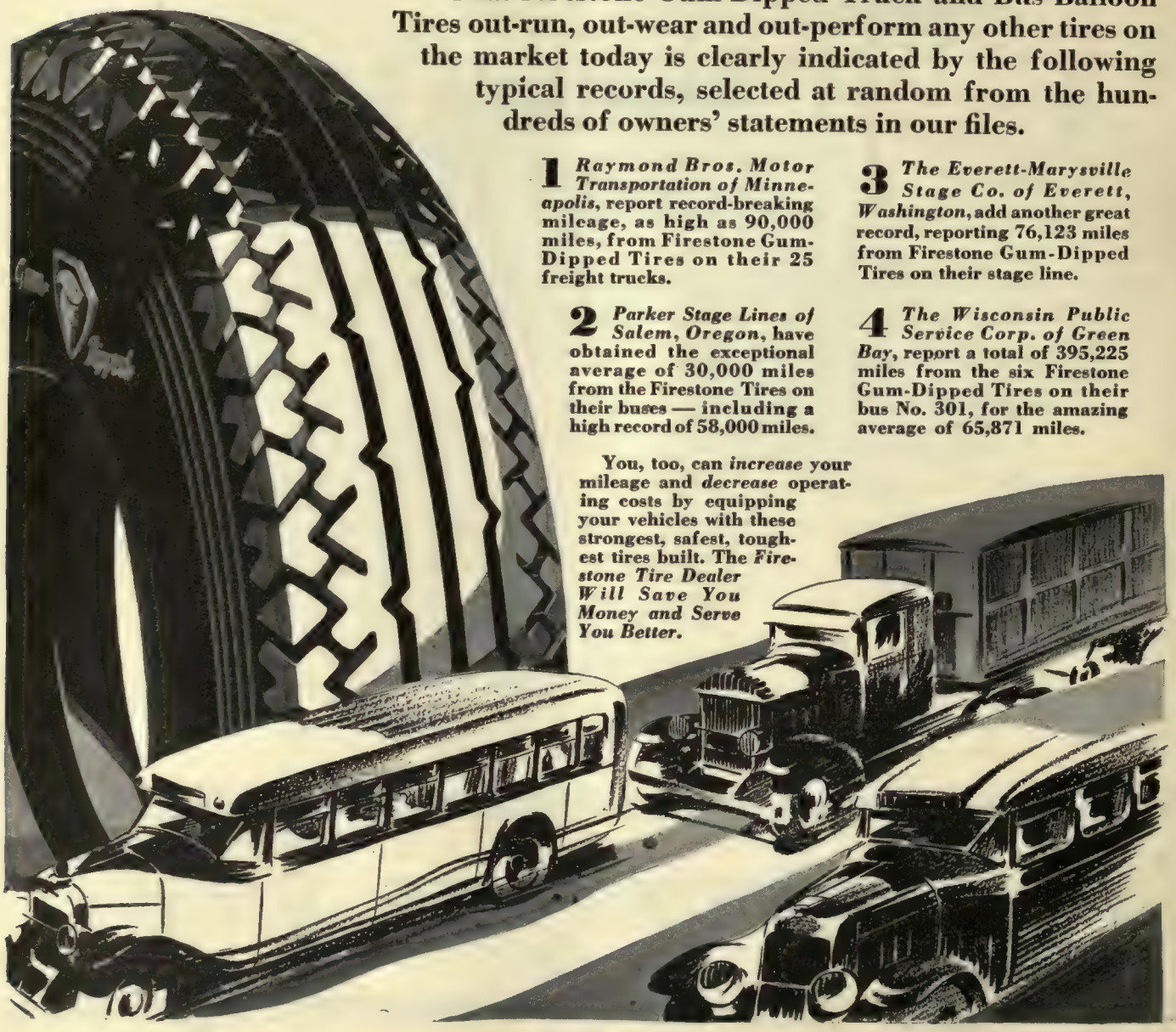
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2 ***Parker Stage Lines of Salem, Oregon,*** **have obtained the exceptional average of 30,000 miles from the Firestone Tires on their buses — including a high record of 58,000 miles.**

3 ***The Everett-Marysville Stage Co. of Everett, Washington,*** **add another great record, reporting 76,123 miles from Firestone Gum-Dipped Tires on their stage line.**

4 ***The Wisconsin Public Service Corp. of Green Bay,*** **report a total of 395,225 miles from the six Firestone Gum-Dipped Tires on their bus No. 301, for the amazing average of 65,871 miles.**

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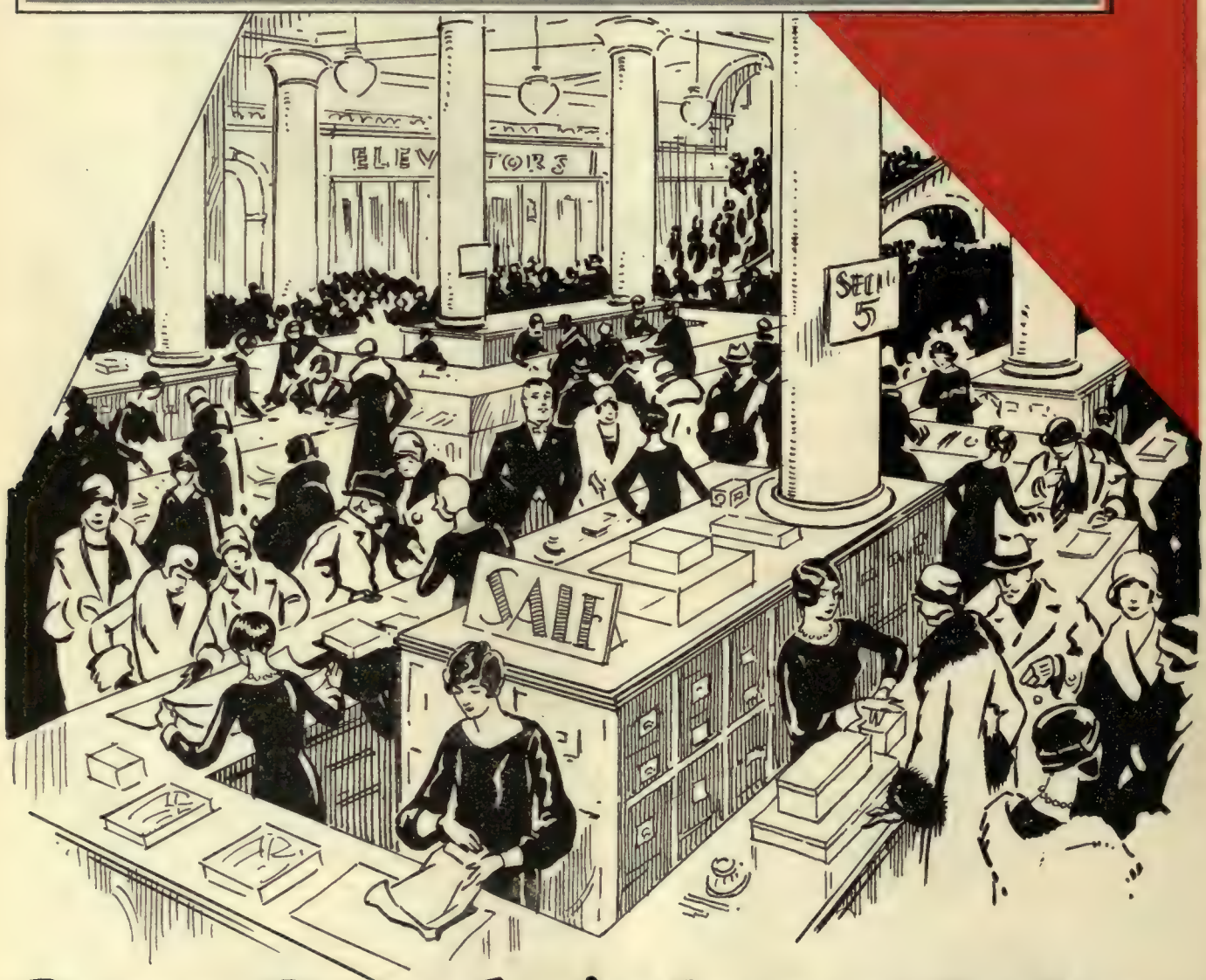
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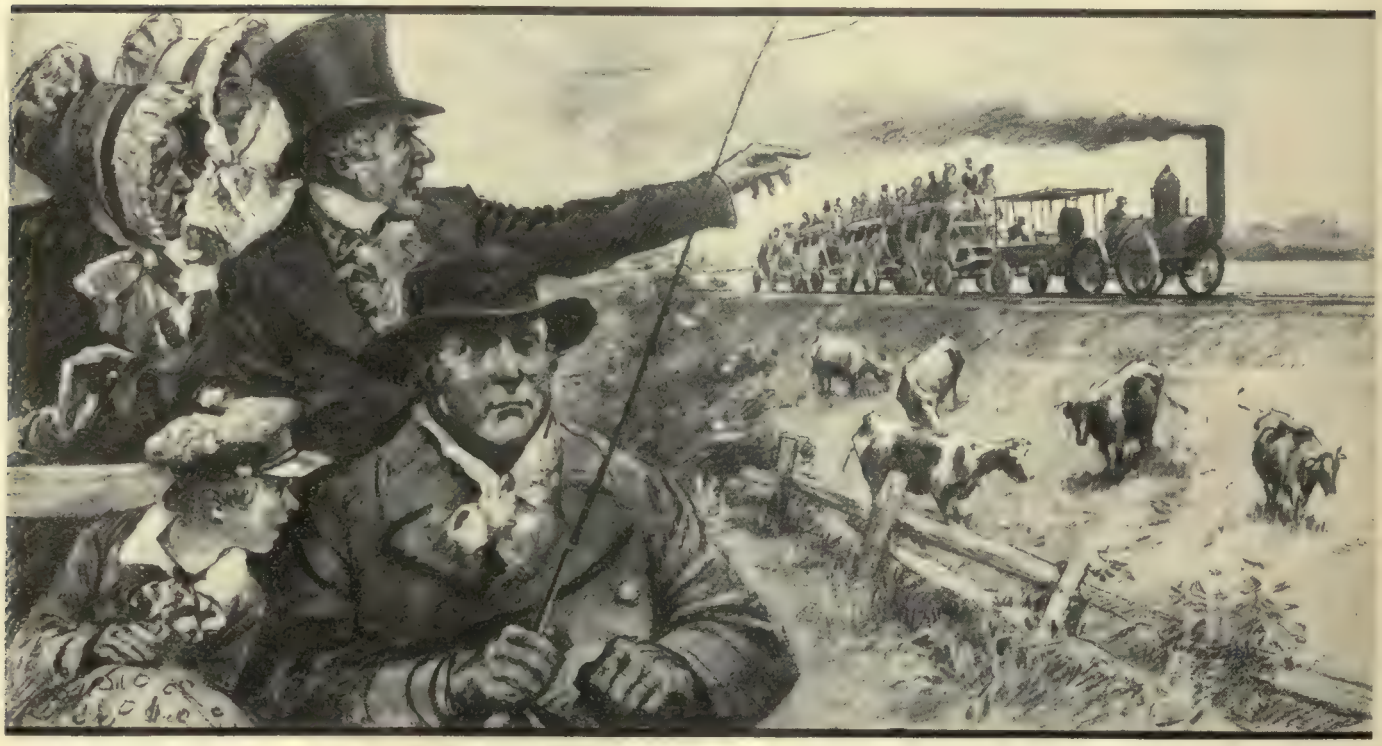


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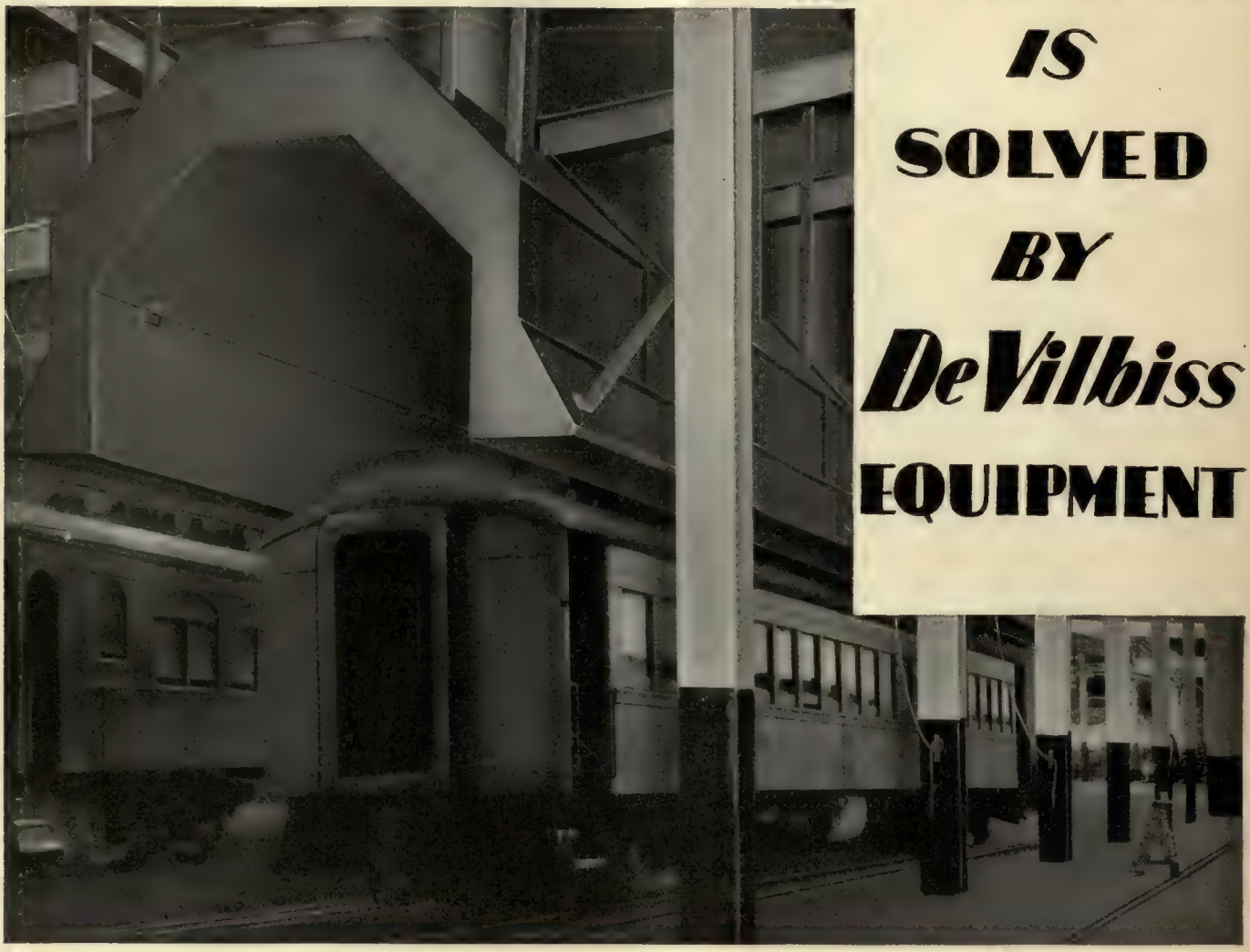
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68-72 Windsor House, Victoria St., London, S.W.-1.

That 1930 BUDGET

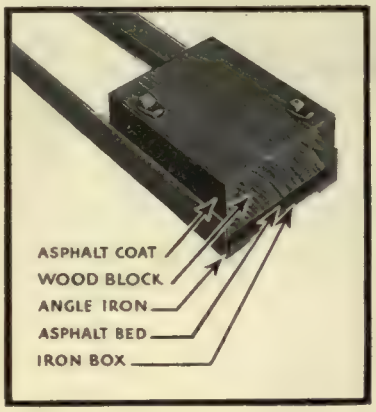
When expediency demands that tracks be renewed, economy also demands that permanency be a vital consideration. Can these factors of expediency and economy be combined safely in your 1930 budget? READ

Dayton Mechanical Ties depend upon no factors other than their own inherent merit, to successfully bear the burden of traffic without danger to track substructure or excessive rail wear.

In every single instance of installation over a period of seventeen years, where time has been more than sufficient to demonstrate their worth . . . these facts stand out . . . FIRST that Dayton Ties cut maintenance costs to a minimum . . . SECOND that track substructure and pavement remain absolutely intact.

Dayton Ties not only introduce the vibration absorbing feature of wood ties in gravel ballast but also provide a supporting structure to pavement that positively and permanently protects it from destruction by traffic. Before specifying *any* tie for your 1930 work ask yourself this simple question:

Are you *sure* that any other tie is quite as safe?



***VIBROLITION**

A coined word denoting demolition of rail substructure through rail vibration. Dayton Mechanical Ties positively prevent VIBROLITION.

Rail Vibration cannot be safely buried in a track structure without placing in the track structure an agent that will counteract its destructive effect. "VIBROLITION" (demolition of substructure as a result of rail vibration) can be prevented only through the use of Dayton Ties. They are the only ties that successfully utilizes a vibration absorbing element. This element absorbs rail vibration and gives positive and permanent protection to substructure and pavement. To specify Dayton Ties is to *insure* the permanence of your track construction. Our new 1930 catalogue is now ready. Your request will bring full details promptly.

THE DAYTON INTEGRAL SYSTEM OF TRACK AND PAVING STRUCTURE

THE DAYTON MECHANICAL TIE CO., Dayton, Ohio



Plant of
Consolidated Car-
Heating Company,
Albany, N. Y.

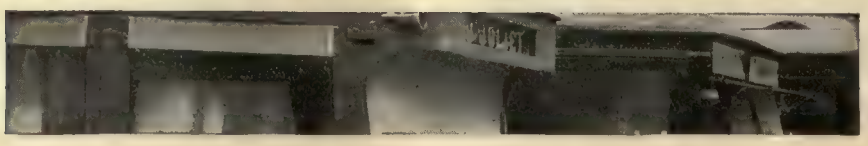
Headquarters for

Electric Car Heaters
Window Sill Heaters
Thermostats
Pneumatic Door Operating Equipments
Automatic Treadle Doors
Safety Door Relays
Safety Reversing Doors
Safety Heater Switches
Motorman's Signal Lights
Buzzers and Bells
Automatic Ventilators
Steam Heaters for Busses

CONSOLIDATED CAR-HEATING COMPANY, INC.

NEW YORK ALBANY CHICAGO

HERE



is the greatest *testimonial* of all!



MONTH after month we have published in these pages the reports of motor coach operators who use Goodyear Tires.

Impressive facts—but here is one which totals all the rest.

In motor coaches, all over the world, more people ride on Goodyear Tires than on any other kind!

The simple and powerful reason for this fact is that more coach fleets are equipped with these tires—more operators have found by practical experience that Goodyear Tires deliver what they need, in surplus measure.

Here is the vote of companies like your own—operating passenger coaches under your type of operating conditions. On level city boulevards—on hilly city streets—in city to city service up and down the east coast—or on desert and mountain trails in the far west—Goodyears are serving and satisfying more motor transportation companies than any other tires.

They must show their greater economy on cost records—they must demonstrate their greater vitality on fast long trips—they must prove their greater traction on every type of road—otherwise they would not have and hold this outstanding position.

ON YOUR NEXT COACHES, SPECIFY GOODYEARS

What can you find in other tires, which you will not find in greater measure in Goodyears?

GOODYEAR

THE GREATEST NAME IN RUBBER



PREFERENCE OF

PATRONS

HIGH



COSTS

LOW

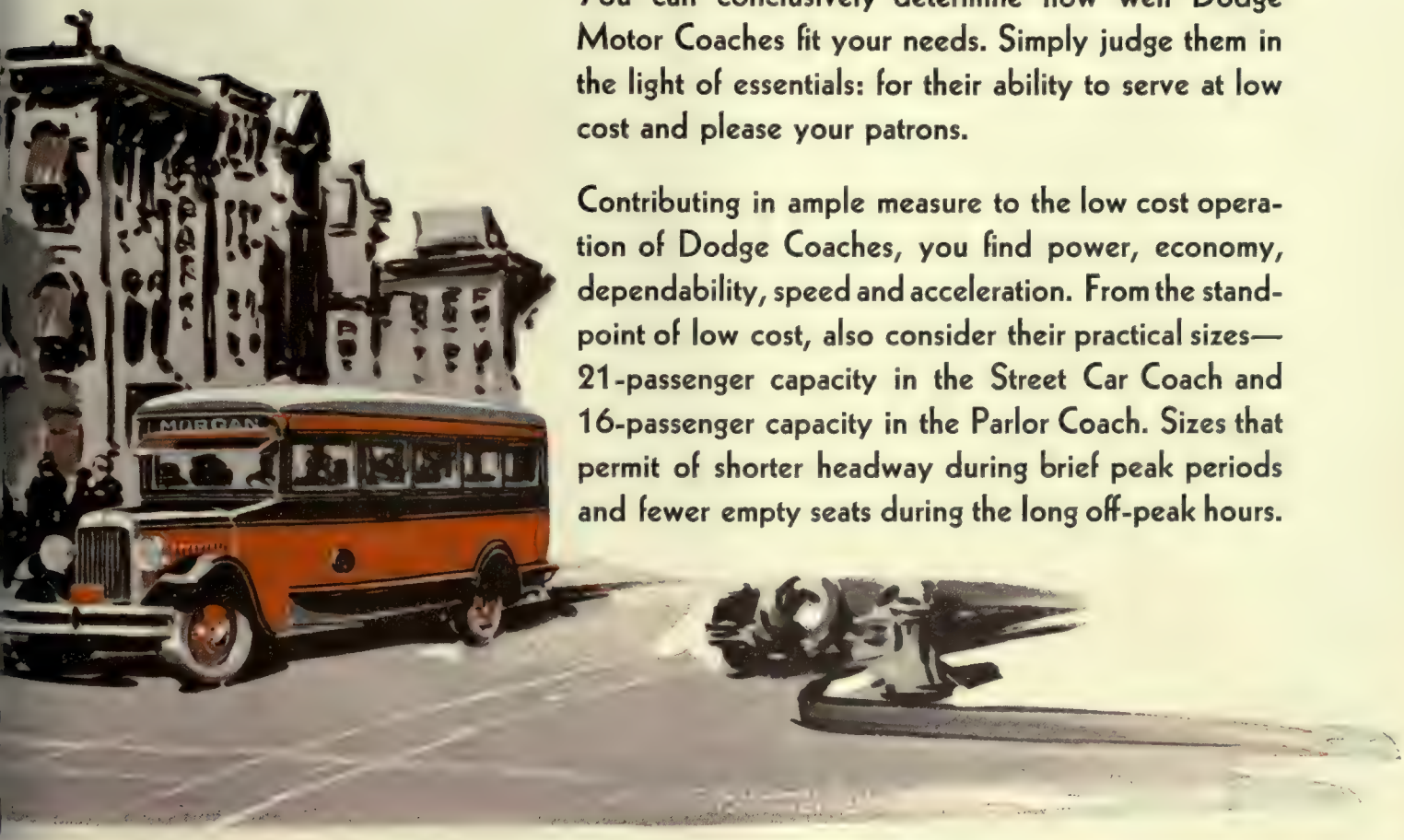
Your costs low—



DODGE BROTHERS

your patrons pleased with Dodge Coaches

No operator asks for more—no motor coach can provide more » » » »



You can conclusively determine how well Dodge Motor Coaches fit your needs. Simply judge them in the light of essentials: for their ability to serve at low cost and please your patrons.

Contributing in ample measure to the low cost operation of Dodge Coaches, you find power, economy, dependability, speed and acceleration. From the standpoint of low cost, also consider their practical sizes—21-passenger capacity in the Street Car Coach and 16-passenger capacity in the Parlor Coach. Sizes that permit of shorter headway during brief peak periods and fewer empty seats during the long off-peak hours.

MOTOR COACHES

Contributing to low maintenance costs



ROOF, of Haskelite, supported by laminated ribs, is strong and weave-proof. Heavy felt padding between top covering and wood effectively protects the covering.

INSULATED BODY WIRING is carried in channel in dome-light rail. Greater protection and ease of access result.

DRIP MOULDING is amply deep and of heavy construction. It provides the needed protection to insure efficient drainage in all weather.

CADMIUM PLATED SCREWS, exclusively, are used in construction of body. These rust-resisting screws prevent premature destruction of the wood at points used.

ALL WOOD PARTS are of oak, thoroughly lead primed. Body will endure for a longer period.

EACH OUTSIDE METAL PANEL overlaps the one immediately below it. All joints are covered with half-oval aluminum moulding. Such care insures in design and construction more effective weatherproofing, a more finished appearance and longer life.

SKID RAILS, on sides and rear of coach, provide added safety for passengers and material protection to body.

SKIRTING is securely braced and adequately protected by sturdy angle irons. Long body-life and protection in even unusually severe coach service, are assured.

WINDOWS are of brass sash with pinch locks operating on brass slides. They are free from rattle.

Add to this list of advantages such motor coach essentials as metal nonskid entrance step, removable safety mat in aisle and genuine leather seats of sturdy, enduring construction. Body maintenance costs are sure to be low.

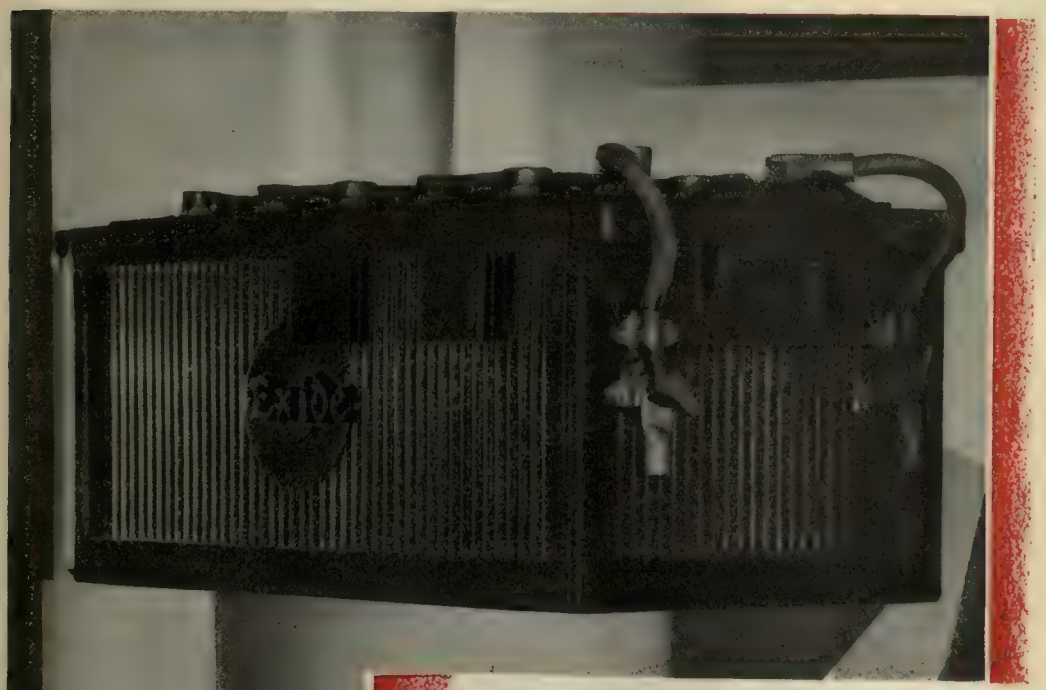


B-1279

DODGE BROTHERS
MOTOR COACHES

New Exide Battery

Specially Built for Hard Motor Coach Service



Latest development of Exide engineers meets demand for improved battery service

No more rotting battery boxes. No more containers wet and soggy from last week's storm. New Exide composition case eliminates these annoying, cost-building evils. The case is impervious to the damaging effects of mud, water, acid and hard knocks.

Now you can have the famous dependability, power, economy of Exide Motor Coach Batteries in a composition case that will wear as long as these long-lived batteries . . . will stand up under the tough treatment a bus battery gets.

Write today for full information on Exide Motor Coach Batteries in the new composition cases. They are built to cut your maintenance costs.

Exide

MOTOR COACH BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto



METAL & THERMIT
PITTSBURGH CHICAGO BOSTON 120 BROADWAY

A CLEAR TRACK AHEAD

Have faith in the future *of the* TRANSPORTATION INDUSTRY

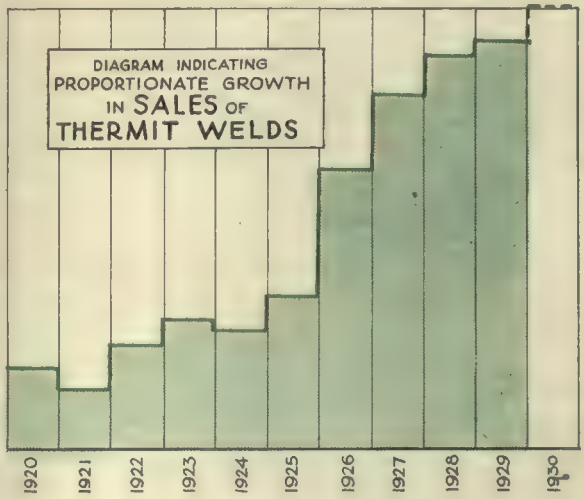
NOT words, but deeds must be used as the yard-stick with which to measure all progress made in the past, and as a basis for predicting the future.

In spite of the prophets of gloom, the motor bus has not ruined the electric railway business. Rather, it has become an important adjunct to the operations of the established transportation companies. If some track mileage has been abandoned, here and there, it represents that over-building which every industry experiences in its earlier years.

Look rather at the positive side of the picture! The statistics in this issue tell the story of an industry with a billion dollar revenue. New cars and buses added, hundreds of miles of track rebuilt, and extensions made. A budget for 1930 of about $300,000,000 for maintenance, and for betterments and extensions. These are the attributes of a going concern.

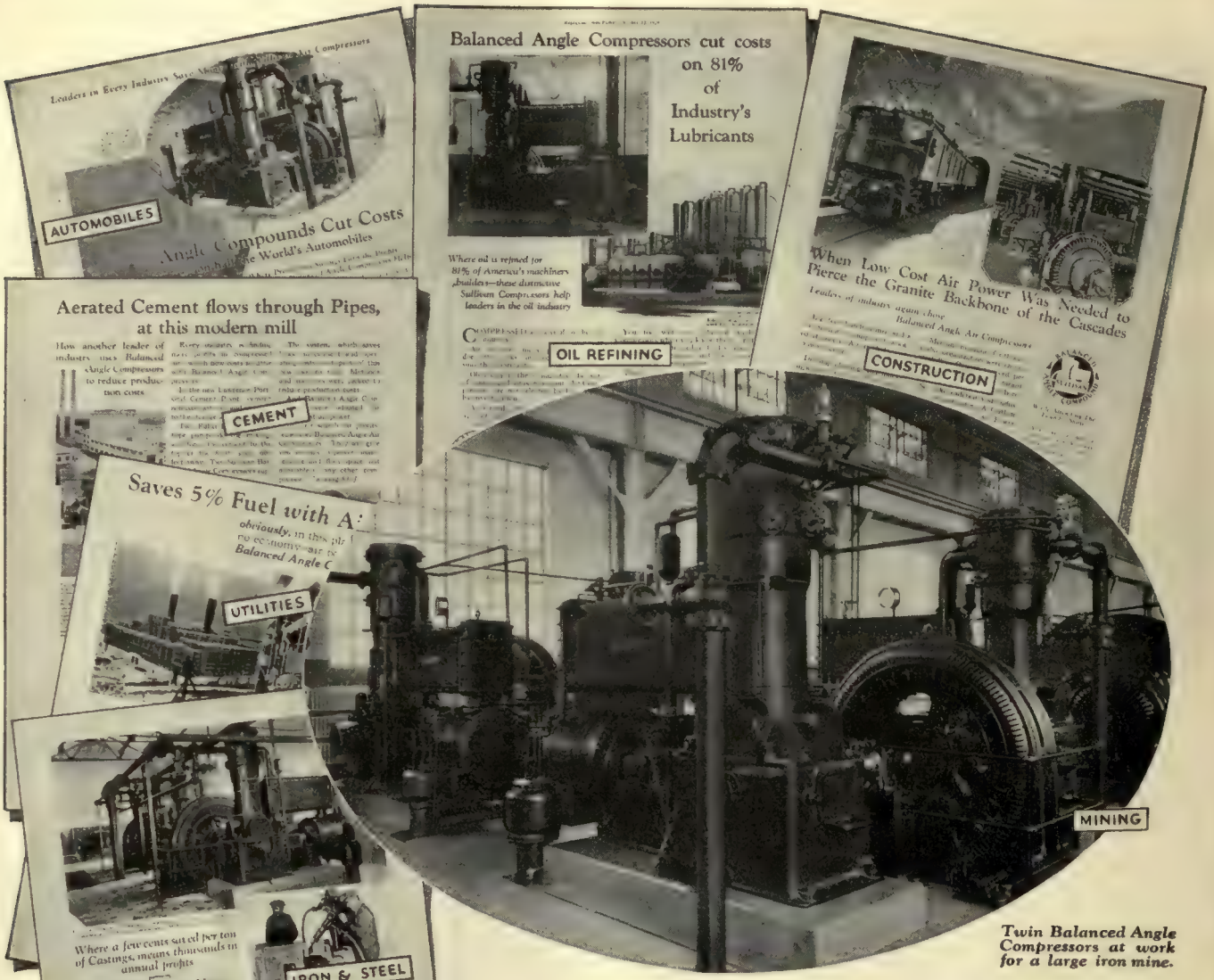
To this picture the Metal & Thermit Corporation adds this report for 1929—*more Thermit Welds sold than ever before!* For 1930, the programs already revealed to us by leading electric railway customers indicate substantially more work planned than in 1929. The release of money formerly tied up in speculative enterprises will make it easier for the railways to finance improvements and additions.

Metal & Thermit Corporation has much at stake in the success or failure of the electric railway industry. In expressing our own confidence in the future of your industry, we are reciprocating that confidence you have always shown in our product.



CORPORATION

NEW YORK, N.Y. SOUTH SAN FRANCISCO TORONTO



Twin Balanced Angle Compressors at work for a large iron mine.

Send for portfolio of advertisements showing Balanced Angle Compressors, in plants of industry's leaders.

Big Business Adopts Balanced Angle Compressors

Big business is setting a new pace. Facts—not opinions—are guiding its methods and selection of machines.

And big business has adopted air power by Balanced Angle Compressors.

Builders of half the world's automobiles—

Makers of two-thirds of America's electrical equipment—

Refiners of eighty percent of industry's lubricants—

Great foundries, power plants, lumber mills, mines—

—now save money with Balanced Angle Air Compressors.

For these distinctive machines have proved their ability to supply air for less power, and lower maintenance.

The facts that persuaded big business to use Sullivan Compressors are available for you.

Send for Booklet 83-J.

SULLIVAN
MACHINERY COMPANY

809 Wrigley Building **Chicago, U. S. A.**

Offices in all principal cities in the world



More Brill-Timken Trains

Because they practically eliminate starting resistance—because they need lubricating less often—because they require merely routine attention even after thousands upon thousands of miles, Timken Bearings have established themselves with both the builders and the operators of cars. Timkens are more than just anti-friction bearings. The total carrying ability of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken steel includes radial, thrust and combined loads.

TIMKEN BEARING EQUIPPED

Without compromise—without complication—Timken Bearings materially help in putting rail transportation on a more economical basis.

THE TIMKEN ROLLER BEARING CO.
C A N T O N , O H I O

TIMKEN
Tapered
ROLLER BEARINGS

THE CHOICE OF LEADING BUS FLEETS—because of its outstanding record

The U. S. Royal Heavy Service Tire asks no odds when it goes into bus service.

Its record on many of the country's most prominent fleets stands as full proof of its ability to deliver trouble-free mileage at low cost.

For those operators changing to balloons—the U. S. Royal Heavy Service Balloon is in equally high favor because it has qualified as having the same superior qualities associated with the high pressure Royal Heavy Service.

UNITED STATES RUBBER COMPANY

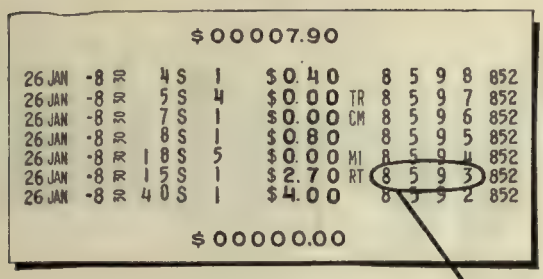
THE WORLD'S LARGEST PRODUCER OF RUBBER



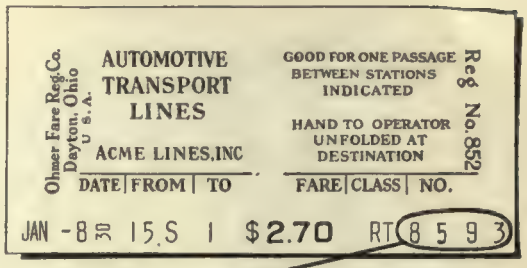
U.S. ROYAL HEAVY SERVICE BALLOON



The great fleet of de luxe motor coaches operated by Union Pacific Stages, Incorporated, covering the northwest, are equipped with U. S. Royal Heavy Service Tires to meet the demands of a transportation service famous for its smooth operation.



Here is a section of the detail strip from a Class 80 Register. Because of the wide detail strip (4¼ inches) a complete record with proper column spacing is made possible.



Tickets issued from OHMER Registers give exactly the same information as the detail strip. They are of the same shape and size, and have the same value to passengers as purchased railroad tickets.

8593

Consecutive Number on
Detail Strip *and* Ticket

Only OHMER *gives you this added protection*

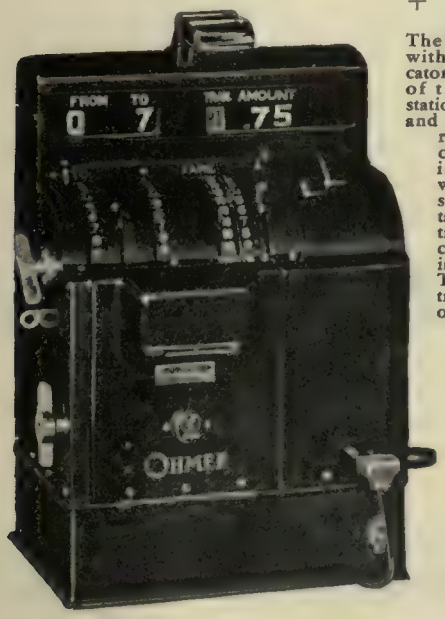
HERE'S a feature that you need on all your ticket-printing fare registers. It's a feature that was developed by transportation specialists to give you added protection through a complete check on every sale.

When the consecutive number appears on detail strip *and* ticket, you can positively identify each ticket with the corresponding sale on the detail strip. You can save time by auditing fares consecutively . . . a system impossible with any other register. You can make checking definite and simple.

And in addition, the detail strip carries the operator's number . . . another feature that makes the audit of sales even more positive and more accurate.

Other information appearing on the detail strip and ticket is the *Date,* the *From* and *To* stations, the *Division* traveled, and the *Amount* and *Class* of fare. No other fare register in the world gives so much information and so much protection.

+ + +



The Class 80 Register with large visual indicator shows the numbers of the From and To stations and the amount and class of fare. This register has the exclusive OHMER pre-indicating feature which makes it possible to detect mistakes before registration. Repeat tickets can be issued by pressing a single button. The register is electrically or manually operated.

Now . . . a more perfect "On and Off" Check

Our transportation specialists have devised a new "On and Off" check. It is simple, accurate and sure. We want you to see how it works. Send for your free copy of the folder in which it is completely described.

OHMER

REG. U.S. PAT. OFF. AND OTHER COUNTRIES

FARE REGISTER COMPANY

Dayton, Ohio, U.S.A.

9-30

An Essential

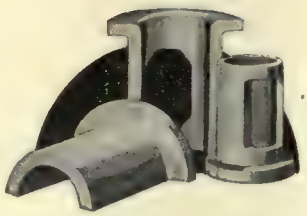
quality materials

sound engineering

extensive facilities



Trolley Wheels and Harps



"Tiger" Bronze Axle and Armature Bearings



M-J Armature Babbitt

Combination *for Perfect Service*

QUALITY materials, sound engineering, and extensive facilities unite to produce these products of the National Bearing Metals Corporation. Such a combination has been at the service of the industry since the first street cars appeared. Such a well-organized background has made it possible to meet the requirements of the industry as conditions have changed and progress has been made.

Armature Babbitt Metal

Twenty-five different grades of babbitt have been successfully perfected in our line, designed for varying services and at varying prices. "Armature" for electric railway motor bearings is unexcelled for durability and economy.

Trolley Wheels

This company is the largest manufacturer of trolley wheels and harps. Many of our products have been perfected in co-operation with experts from various large electric railway systems.

"Tiger" Bronze Axle and Armature Bearings

Being one of the early achievements of this organization and probably the most widely known bronze on the market, "Tiger" Bronze has done much to establish the National Bearing Metals Corporation as one of the leaders in bearing manufacture.

The personnel of the More-Jones organization is composed of many men, of proven ability, whose connections with it date back to the very beginning of electric railway transportation in America.

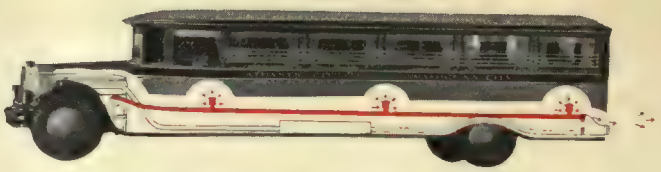
These specialists, versed in your problems, will gladly work with you at your request.

NATIONAL BEARING METALS CORPORATION
More-Jones Division
ST. LOUIS, MO.

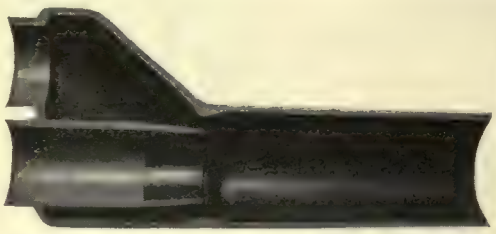
New York, N. Y. Jersey City, N. J. Pittsburgh, Pa. Meadville, Pa.
Portsmouth, Va. St. Paul, Minn.

THIS WINTER-

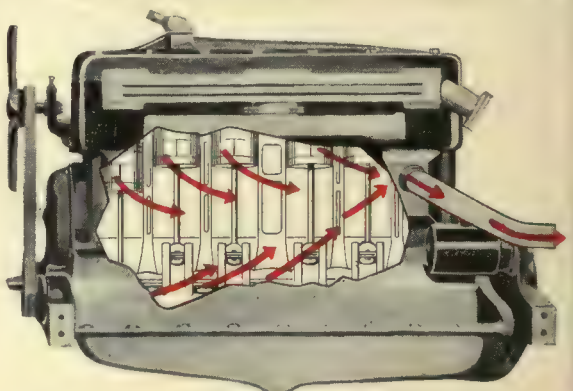




The suction pipe connects with dome-shaped ventilating heads in the floor of the bus, drawing out the foul, cold air, and causing efficient circulation of warm, fresh air without drafts.



The Vac-Vent Ejector, the heart of the system. Exhaust gases from the motor in leaving the jet, create a powerful suction in the surrounding chamber. This is the operating force upon which the Vac-Vent system depends. A vacuum pressure of two pounds is often produced.



The vacuum set up in the Vac-Vent ejector draws off the vapors, gas fumes, carbon particles and excessive heat, which ordinarily mix with the crankcase oil, reduce the motor life, blow out the breather, and get into the body.

will your buses furnish passengers with stuffy—drafty—gas poisoned air—

or will those buses be equipped with "Vac-Vent"?

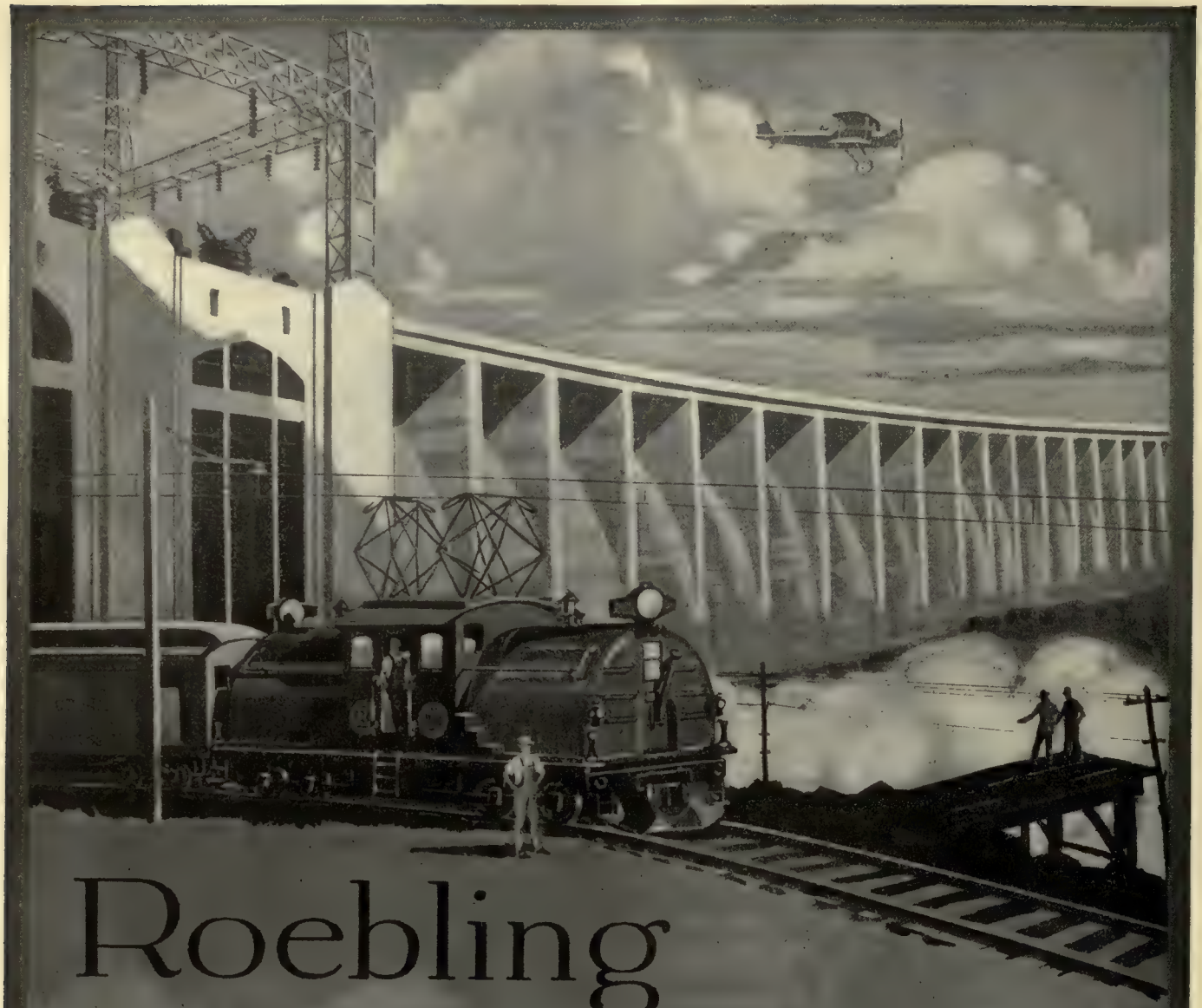
(THE COMPLETE BUS VENTILATING SYSTEM)

No matter how luxuriously your buses are furnished or how comfortable the seats—your *passengers* will not be comfortable unless you take steps to remedy the ventilation evil.

Vac-Vent, the new ventilating system of radical, yet sound principle, is already adopted and enthusiastically praised by leading operating officials. Why? Because Vac-Vent easily accomplishes what no other ventilating system has even attempted to do—it thoroughly ventilates *both* the bus body *and* the motor crankcase. There are no moving parts—and no maintenance. The results depend upon a never-failing source of supply—the powerful *exhaust* from the bus motor. By surrounding the end of the exhaust pipe with our Vac-Vent Ejector, a vacuum is produced, which sucks out all of the vapors, fumes and carbon particles which blow by the pistons. The connecting pipe has two or more ventilating heads which project through the bus floor, drawing out the heavy, foul air *at the floor line*, and causing even distribution of fresh heated air.

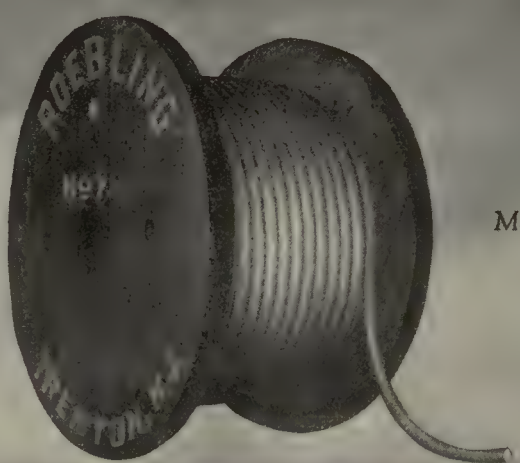
Vac-Vent prolongs motor life, because of elimination of diluting and contaminating elements, and the reduction of motor temperature. It completely ventilates the bus. Get in touch with us now, in time for deliveries before bitter weather becomes the rule.

MOTOR CAR VENTILATOR CORP. Vac-Vent SUFFOLK VIRGINIA



Roebling

Whether your needs are for the finest Magnet Wire for electrical equipment; aircraft or automotive cables; underground or overhead transmission cables required for hydro-electric developments, Roebling Quality Products can be depended upon for long and satisfactory service.



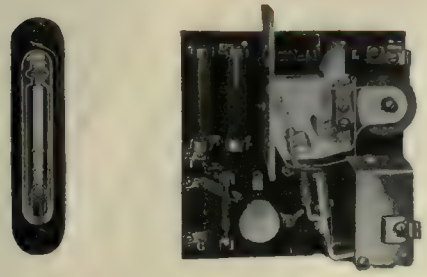
John A. Roebling's Sons Company
Trenton *New Jersey*

Makers of Wire Rope, Wire and Electrical Wires and Cables

UTILITY means ECONOMY AND SERVICE



Below — Thermo-control and Heat Regulator Panel. Note the simplicity of assembly and rugged construction.





The Chromalox Strip shown below is the heart of the Utility Chromalox Cross Seat Heater. An unusually efficient heating unit listed as standard by Underwriters' Laboratories.



UTILITY Heating and Ventilating Systems, render adequate ventilation and proper car temperatures, providing comfortable transportation that increases revenue. Furthermore, many old heating systems are wasteful and uneconomical. Again you may be dividing your profits by unnecessarily high heating costs.

Let us tell you about Utility Compensating Systems of natural ventilation.

RAILWAY UTILITY COMPANY

2241 TO 2247 INDIANA AVE. CHICAGO, ILLINOIS

J. H. Denton—Eastern Manager 1328 Broadway, New York City



. . . . Modern rolling mills, expert supervision, regular and frequent inspections are incorporated in every Gary Wrought Steel Wheel, giving that dependable service electric railway men *expect* in products bearing the name ILLINOIS. . . . *Our wheel engineers are at your service.*

Illinois Steel Company
Subsidiary of United States Steel Corporation
Chicago, Illinois

ALL THAT GOOD WHEELS SHOULD BE

ANACONDA
from mine to consumer
REG.U.S. PAT.OFF.

A *complete* wire and cable service

THE NEW YEAR finds Anaconda Wire and Cable Company in a better position than ever before to offer a complete wire and cable service to the electrical industry.

NINE WIRE MILLS, strategically located throughout the country and supplemented by convenient warehouse stocks, make possible a coast-to-coast service unequalled for promptness and dependability. Modern and efficient mill equipment strengthens production facilities and speeds deliveries. The coordinated supervision by a single organization from ore to finished product—*from mine to consumer*—guarantees the high conductivity and uniform quality of all Anaconda wire and cable products.

FIFTEEN SALES OFFICES dot the map between Boston and San Francisco, making Anaconda service immediately available everywhere. Our Engineering Department, with its background of metallurgical experience covering more than one hundred years, offers its facilities to electrical engineers to assist in the design and construction of cables to meet special and unusual requirements.

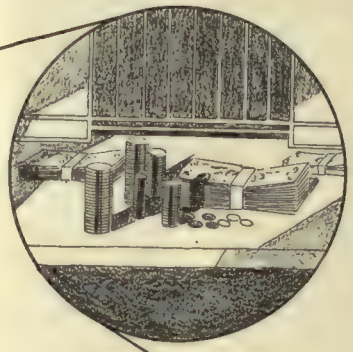
IN A WORD, Anaconda offers a complete wire and cable service—*wires and cables for every electrical requirement*—and makes available to the industry the vast resources and technical facilities of the Anaconda organization. We welcome the opportunity of cooperating with you.

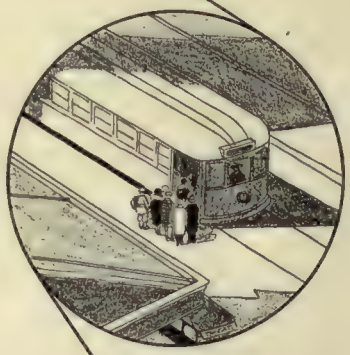


Anaconda — safeguards quality from mine to consumer—provides a nation-wide service, prompt, dependable and complete.

ANACONDA WIRE & CABLE COMPANY
General Offices: 25 Broadway, New York
Chicago Office: 111 West Washington St.
Sales Offices in Principal Cities



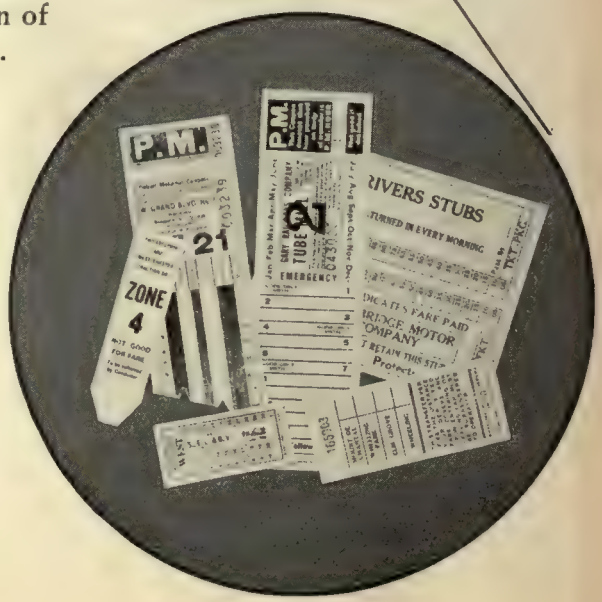




Globe designed tickets and transfers help you realize most on every riding dollar

A transfer designed to eliminate a large percentage of the ever-present abuses at transfer points; a ticket designed to save the conductor's time and eliminate change-making, a "hat check" to eliminate overriding, a weekly and Sunday-pass to increase riding during off-peak hours and to give revenue in advance . . . these are a few of the concrete examples of Globe service in assisting operating companies to solve their fare problems.

Globe service has the verbal and written O.K. of most of the important operators. Globe experience is a tangible asset . . . resulting in increased revenue for you, and the elimination of fare difficulties. Write.



Globe
TICKET COMPANY
PHILADELPHIA

Factories:
Philadelphia Los Angeles Boston New York Jacksonville

Sales Offices:

Syracuse	Cincinnati	Pittsburgh
Baltimore	Cleveland	Springfield, Mass.



Time changes
but


1928 records of buses bought by electric railways show
TwinCoach 1st
in large capacity buses bo
TwinCoach 2
in total buses bought

1929

Again

in the year just ended Twin Coach maintains its position; repeats its success of 1928.

This success is represented by the sale to electric railways of nearly 40% more 37-40 passenger coaches than were sold by all other coach manufacturers combined.

The railways requiring large capacity street car type vehicles realize that such units to succeed must be built as Twin Coaches are built—with body and chassis integral.

Twin Coach
BY F.R. FAGEOL KENT, OHIO



20th Century Spanish Leathers



Majestic Full Grain Leathers



Better Seats-- *Bigger Revenue!*

They go hand in hand.

For better seats mean greater comfort. And your fare registers will tell the welcome story of increased revenue that follows your catering to the demands of your passengers.

That's one reason why, for seat coverings, General Leathers have had such wide acceptance. Another reason lies in the fact that this durable leather is so easily cleaned with soap and water. It is fast in color. It never gets sticky in any weather. It stands the hardest kind of service.

Hides are furnished in all sizes and colors. On quantity orders, we cut directly from your patterns and this eliminates waste.

Write for samples. Specify General Leathers on your Cars, Buses and Taxi-Cabs or when you overhaul your seat coverings.

GENERAL LEATHER COMPANY

Makers of Famous Tried and Proven "00" Leathers

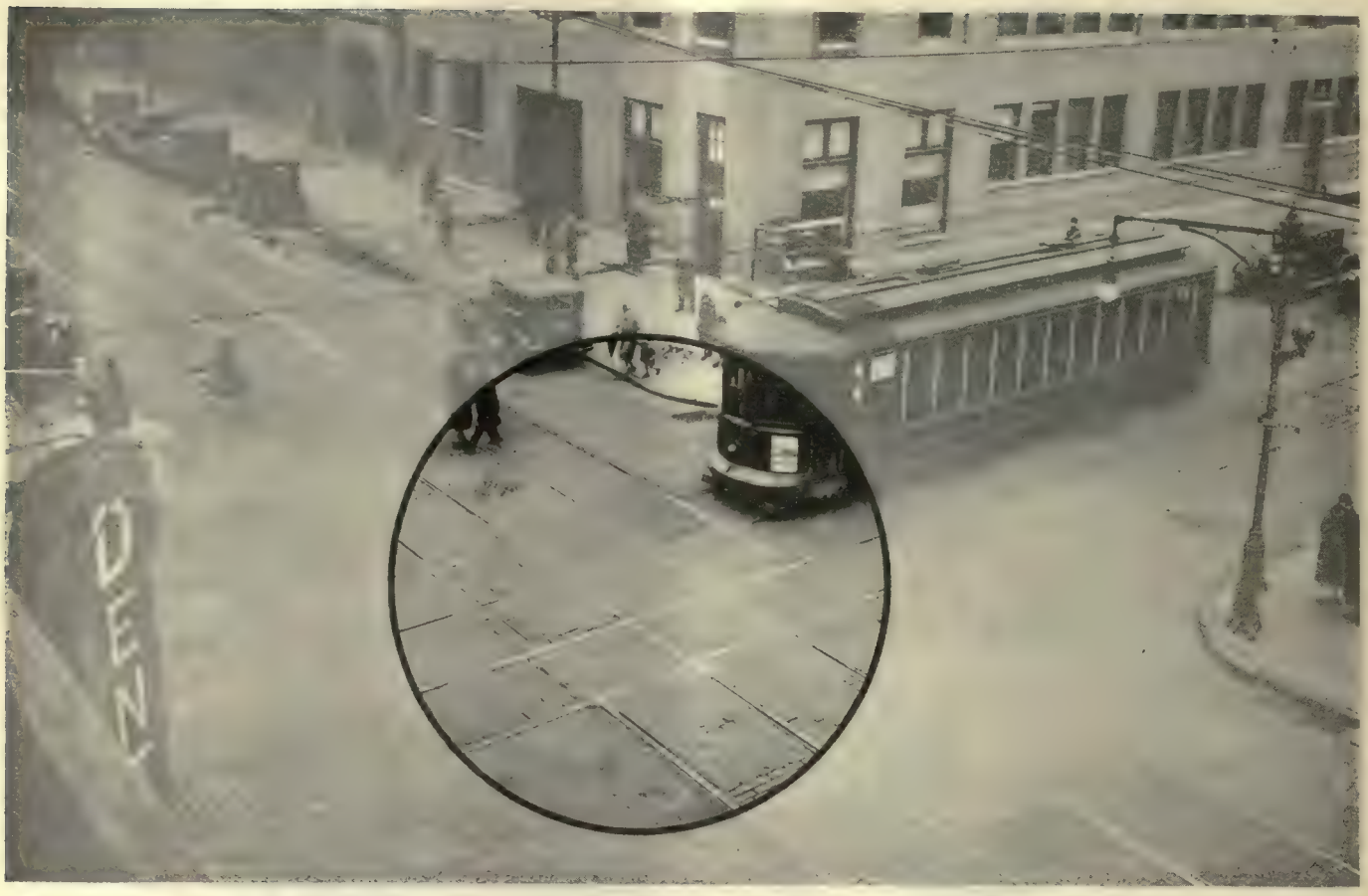
NEWARK, N. J.

Detroit Office
Stoddard Lovely & Co.
10-219 General Motors Bldg.

Colonial Traders, Inc.
78 Williams St.
Chatham, Ont.

London Office
R. & A. Kohnstamm, Ltd.
21 West Smithfield, London, E. C.

West Coast Office
A. J. & J. R. Cook, Inc.
237 Eighth St., San Francisco



Bethlehem Silico-Manganese Weldable Crossing at Ralph and Gates Avenues, Brooklyn, N. Y.

Trackwork—*that is wear-resisting and* Weldable



Installing a Bethlehem Silico-Manganese Weldable Three-Way Turnout. Bethlehem trackwork is assembled in spacious, well-lighted shops by careful workmen to insure quick and easy installation in the field.

Increasingly heavy traffic requires trackwork that is wear-resisting, weldable and thoroughly dependable. Bethlehem Silico-Manganese Trackwork, Design 999, meets all of these requirements. It can be installed at heavy traffic locations with confidence that it will stand up under the most severe service conditions.

Bethlehem Silico-Manganese Trackwork is remarkably wear-resisting and is readily weldable by any of the standard methods, such as electric arc, oxy-acetylene and Thermit Welding.

BETHLEHEM STEEL COMPANY

General Offices: **Bethlehem, Pa.**

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, and Honolulu.

BETHLEHEM
Silico-Manganese Trackwork / Design 999



Wheels—*that meet the demands of modern traffic*

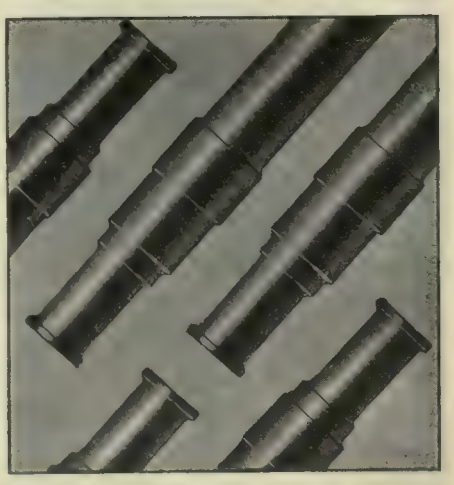
The exceptionally severe service that car wheels undergo today greatly reduces the life of ordinary wheels. Wheels that meet modern traffic conditions must be good wheels.

Bethlehem manufactures and offers to electric railways a wrought steel wheel that has the strength, endurance and wearing qualities to stand up and deliver exceptional mileage under severe modern traffic conditions. Five distinct forging and rolling operations are required to make a Bethlehem Wheel. The forging gives the metal toughness and density. The rolling establishes a uniform grain structure throughout the wheel virtually eliminating crystallization and reducing to a minimum the possibility of breakage.

When you use Bethlehem Wrought Steel Wheels you can rest assured that you will receive from each wheel many thousands of miles of trouble-free service.

BETHLEHEM STEEL COMPANY
General Offices: **Bethlehem, Pa.**
District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, and Honolulu.

BETHLEHEM
Wrought Steel Wheels *and* Forged Axles



FORGED AXLES

Extreme care is exercised in the manufacture of Bethlehem Axles. Special heat treatment gives them ductility and a high elastic limit. They give excellent service under severe torsional stresses.

LONG

PRODUCTS

Automotive

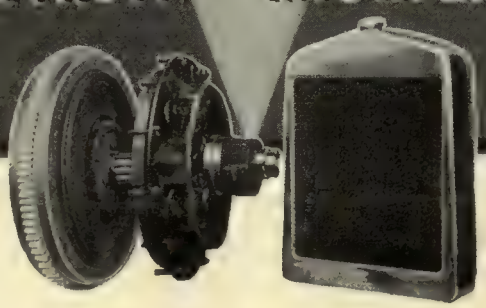
CLUTCHES

and

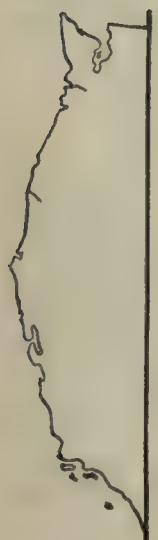
RADIATORS

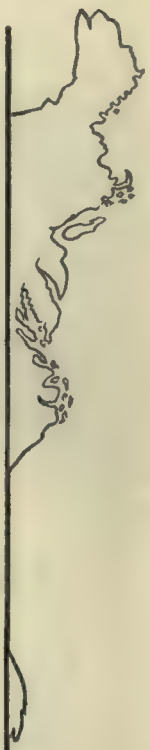
THE LONG MANUFACTURING CO.

DETROIT, MICHIGAN



Mile after Mile of smoother, quieter transportation





ALL over the country—from coast to coast—electric railway systems are adopting the Carey Elastite System of Track Insulation. Mile after mile of new rails will be Carey-insulated, in 1930.

Traction officials approve it because it means lower maintenance costs. The public approves it because it muffles noise—makes for smoother, more pleasant transportation.

Carey Elastite Track Insulation is climate-proof, rot-proof. Water seepage does not affect it—nor does the Summer sun or Winter frost. It eliminates joint ruts, pavement buckling between rails, cracking and spalling of adjoining concrete.

Is it any wonder that you see such a growing use of this product?

If you have any questions to ask about the Carey Elastite System of Track Insulation—write. Full details will be presented to you without obligation.

THE PHILIP CAREY COMPANY
Lockland, CINCINNATI, OHIO

Carey Elastite System of Track Insulation is preformed, under heavy pressure, of durable asphaltic compound, substantially reenforced with asphalt-saturated fibre.

Carey Elastite
REG. U.S. PAT. OFF.
TRADE MARK REG'D. U.S. PATENT OFFICE



SYSTEM OF
TRACK INSULATION

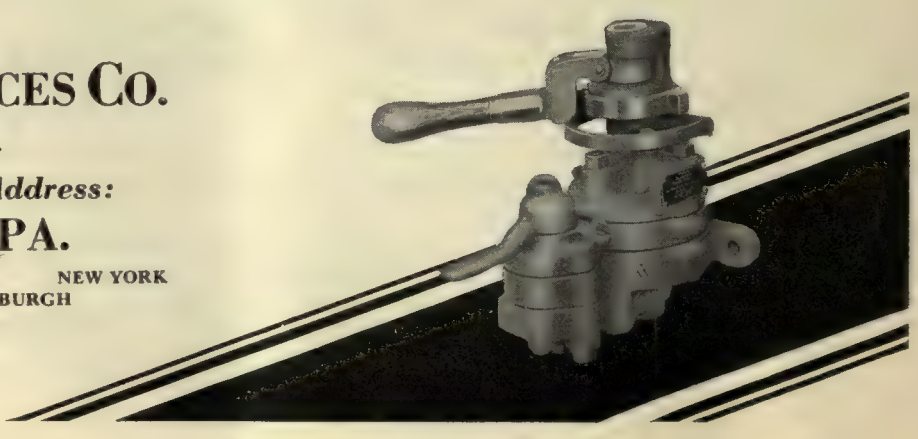
Carey Elastite Electric Railway Products

Carey Elastite Expansion Joint
Carey Elastite Asphalt Plank
for bridge flooring
for water-proofing overhead bridges
Carey Elastite Trunking for signals

The SAFETY CAR CONTROL EQUIPMENT

COMMON . . .
yet not COMMONPLACE

To street railway men this equipment is familiar, yet not devoid of interest. It still attracts attention by virtue of its contribution to safe, speedy, and economical transportation. Its potentiality for improvement in service and public goodwill is being recognized more extensively from year to year.

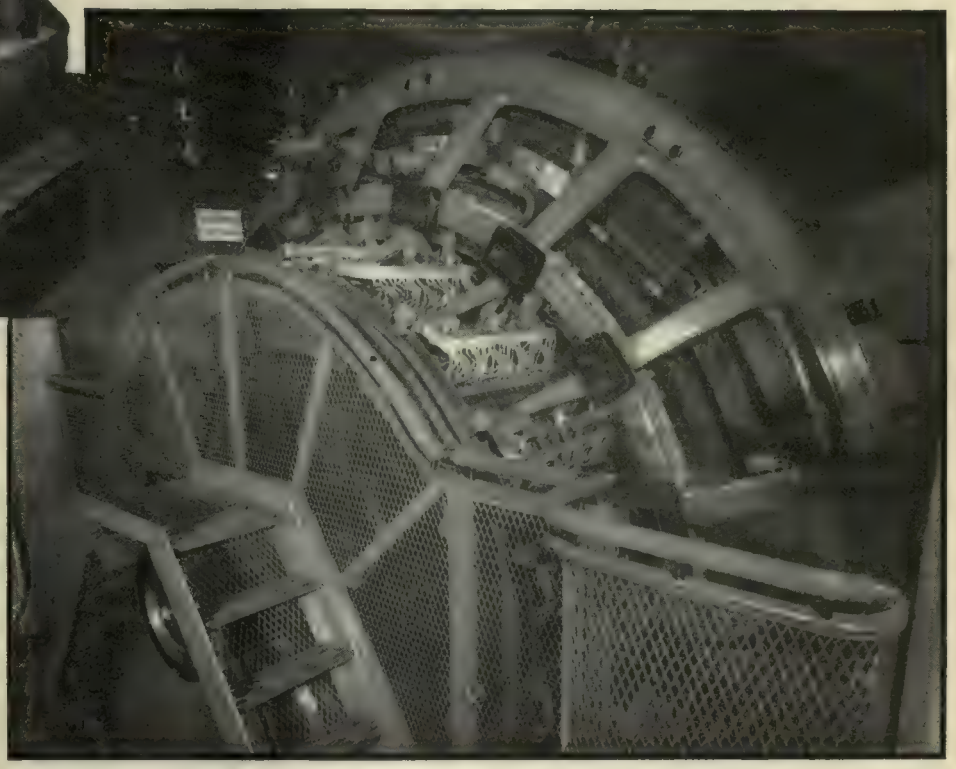


SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK
WASHINGTON PITTSBURGH



50 YEARS

have seen a revolution in the generation of direct current



Above. *An Edison 250-light type K generator in use from 1883 to 1928. Equipped with copper leaf brushes.*

At right. *Modern 4200 KW Rotary Converter, 285 volts, 14,800 amperes. Equipped with National Pyramid Brushes.*

THE past fifty years have witnessed tremendous changes in the design of electrical machinery for the supply of direct current. Throughout these years, National Carbon Company, Inc., has been an outstanding leader in developing new and more efficient carbon brushes for the successful operation of these machines.

When the incandescent lamp was in its infancy, the Edison generator illustrated above was used as the source of electrical power. This generator was belt-driven from a steam engine. Its approximate capacity of 25 kilowatts was considered high.

Compare this with the methods of today. Most direct-current power in use today is initially generated as alternating current, often by units with a capacity of over 100,000 KVA. It is transmitted at high voltage to sub-stations where it is transformed to lower voltage and converted to direct current by means of huge rotary converters. The modern rotary converter illustrated herewith is a typical example.

The various designs of machinery necessary for the collection and redistribution of electrical energy in this highly efficient way would be impossible without carbon brushes. Scientific research in the up-to-the-minute Research Laboratories of National Carbon Company, Inc., always has kept (and still keeps) pace with the ever-changing demands placed on the many types of carbon brushes required.

Engineering science in our laboratories and carefully supervised workmanship in our factories are maintaining for National Pyramid Brushes the leadership established through the years.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division — SILVER STRAND CABLE TRADE MARK REGISTERED — Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco

If SKF Wasn't Quite So Big....

"The Highest Priced Bearing in the World" Would Be Higher Priced



SKF Ball and Roller Bearings have never been sold on any other basis than performance. They can't be. No other bearing in the world costs so much—to buy or to make. But there are other bearings, many of them, that cost more—*much* more—to USE.

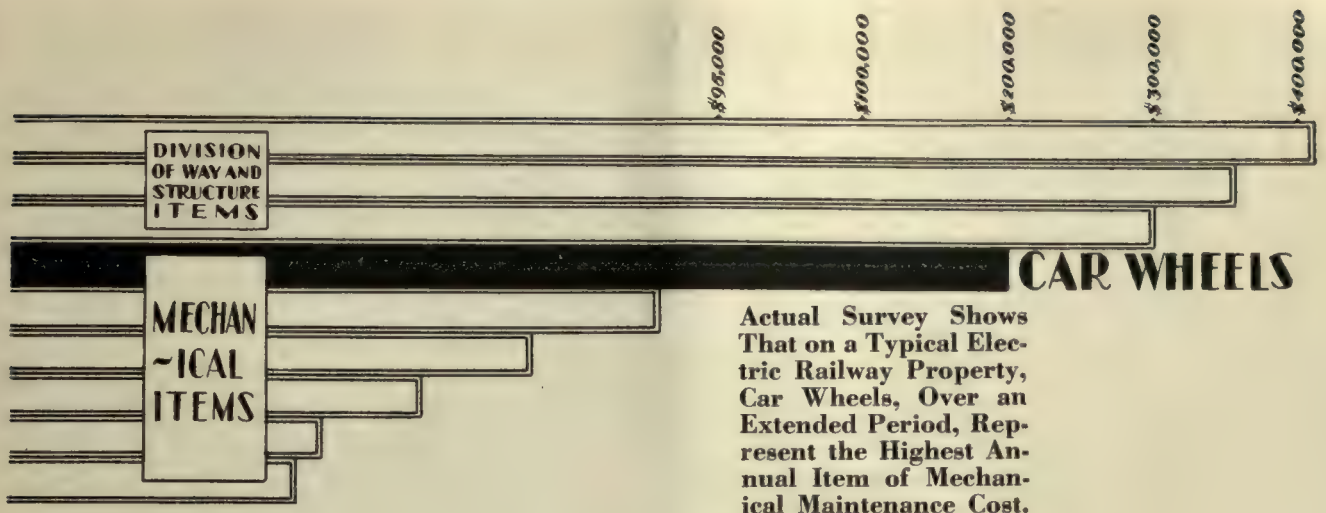
SKF produces not one type but many different types of anti-friction bearings. The special ores it requires come from its own mines. The charcoal it uses in processing its special steels comes from its own forests. Its laboratories, plants, factory branches extend right 'round the world. Among its 23,000 employees 27 languages are spoken.

SKF supplies greater service to *more* customers in *more* places than any other anti-friction bearing manufacturer in the world. And SKF makes "the highest priced bearing in the world."

SKF INDUSTRIES, INCORPORATED
40 East 34th Street, New York, N.Y.

2439

THE HIGHEST PRICED BEARING IN THE WORLD



Actual Survey Shows That on a Typical Electric Railway Property, Car Wheels, Over an Extended Period, Represent the Highest Annual Item of Mechanical Maintenance Cost.

CARWHEEL BUDGETS FOR 1930

WILL BE LOWER FOR THE MANY REPRESENTATIVE ELECTRIC RAILWAY COMPANIES NOW USING

NACO

SPUN STEEL CAR WHEELS

TO SERVE the industry effectively by supplying better car wheels—this was our purpose five years ago when engaging in the manufacture of wheels.

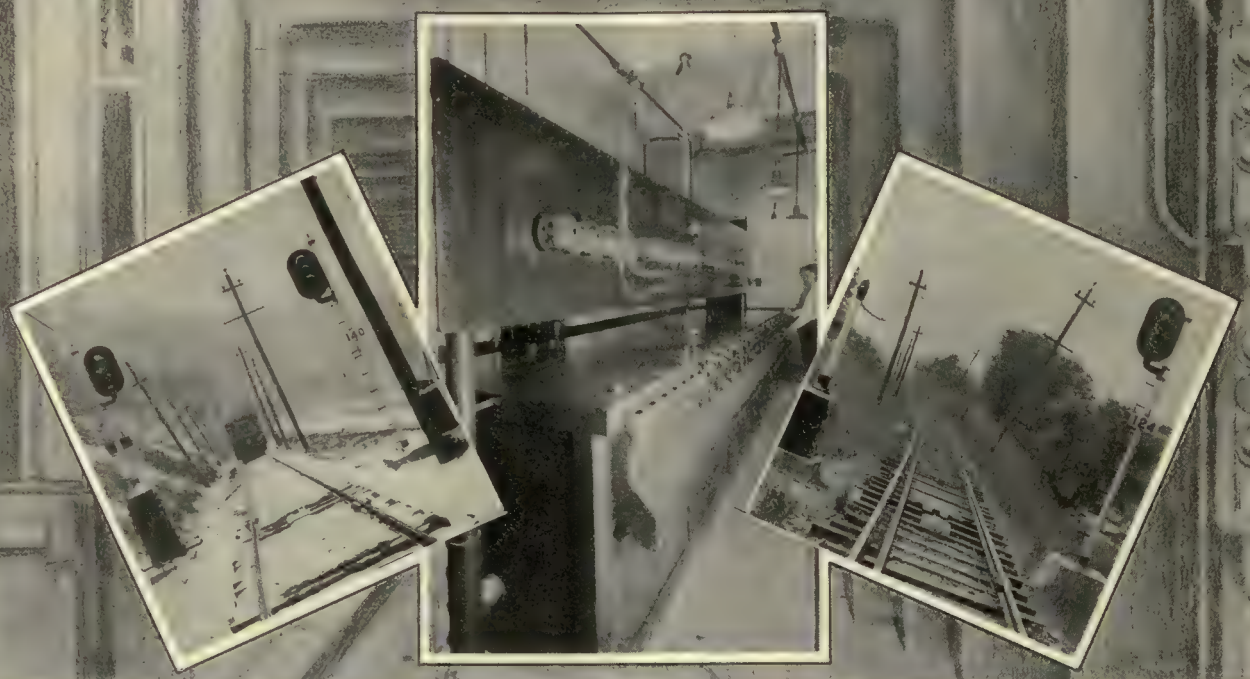
IN THE meantime, actual results covering severe service accurately computed on several properties have definitely established our product as a progressive and timely development.

When arranging your program for the coming year, write NACO SPUN STEEL WHEELS into your specifications for regular replacement use, and for any new car construction. This will lead to lower car wheel budgets over ensuing periods.

National Malleable & Steel Castings Co.

General Offices: Cleveland, Ohio

STEEL PLANTS: Sharon, Pa., Chicago, Melrose Park, Ill.



FOR MORE SATISFACTORY SERVICE

A good remedy for service troubles can usually be found in automatic signaling. "Union" automatic signals, interlocking installations, and power operated, remotely controlled switches are being used to eliminate unnecessary stops.

These installations give definite economies. They permit higher average speeds. The time saved per trip due to signaling can be definitely represented as return on investment. Installations of "Union" apparatus are dependable investments.



Our nearest district office will gladly give you more information on "Union" apparatus.

1881 **Union Switch & Signal Co.** 1930

SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO



Bond Performance

One of the advantages of buying American Steel and Wire Company Rail Bonds is the assurance you will have of dependable performance. The reason is materials, design, and construction. Our experience has been of the kind that is worth money to you in Bond performance.

The AB-2 Bond is easily and quickly applied with a steel electrode. The open shape of this Bond terminal is especially desirable since the arc can be directed freely at the junction of the terminal and the rail.

Would you be interested in inspecting a sample?

AMERICAN STEEL & WIRE COMPANY

208 S. La Salle Street, Chicago 30 Church Street, New York
And All Principal Cities

SUBSIDIARY OF
UNITED STATES STEEL CORPORATION

Quality Products *Dependable Service*

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

American Bridge Company
American Sheet and Tin Plate Company
American Steel and Wire Company
Carnegie Steel Company
Cyclone Fence Company
Federal Shipbuilding and Dry Dock Company
Illinois Steel Company
Minnesota Steel Company
National Tube Company
The Lorain Steel Company
Tennessee Coal, Iron & R. R. Company
Universal Portland Cement Company

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City



Typical installations of Union Metal Fluted Steel Poles

POLES— STRAIGHT STRONG and STURDY

TYPICAL of this modern age is the Union Metal Fluted Steel Pole. Designed with the City Beautiful ideal in mind, it is gracefully tapered and fluted in the manner of architectural columns. Here is no ordinary pole, no public eyesore. Straight, strong and sturdy, Union Metal Poles stand in even rows along the curb-line, monuments to the foresight of progressive utility operators.

Because they are fabricated from heavy steel, they are strong enough to withstand heavy side strains. And because of their strength—and appearance—one set of poles may be used to support lighting units, trolley span wires, traffic signals, and distribution and transmission lines. The result is true economy for the users of the poles and a decided improvement in street appearance.

THE UNION METAL MANUFACTURING CO.
GENERAL OFFICES AND FACTORY: CANTON, OHIO
SALES OFFICES: New York, Chicago, Philadelphia, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

DISTRIBUTORS
General Electric Supply Corp. Graybar Electric Company, Inc.
Offices in all principle cities

Distributed by Graybar

UNION METAL

Merchandise Distributor

DISTRIBUTION AND TRANSMISSION POLES



Mahon Spray Booths installed at the Niles Center Shops of the Chicago Rapid Transit Co.

. . . an *Essential* Part of *Your* Maintenance Equipment

The indisputable economy of Spray Painting . . . the smoother, more durable lacquer finishes . . . the tremendous reduction in the out of service time required for refinishing, and the increased capacity of your paint shop makes Spray Painting Facilities an essential part of your maintenance equipment. ¶ Many Street Railways are seriously considering the adoption of this modern means of cost reduction . . . You too, will install Spray Painting facilities in your paint shop.

¶ When you are contemplating this equipment, remember that Mahon engineers are recognized the world over as a highly specialized staff of Spray Booth experts . . . remember also, that it cost no more for the services of these specialists whose widely diversified experience will prove of inestimable value to you in the economical solution of your Spray Booth problems, both in initial cost and in operating expense over a period of time. Arrange a consultation with Mahon engineers today.

THE R. C. MAHON COMPANY

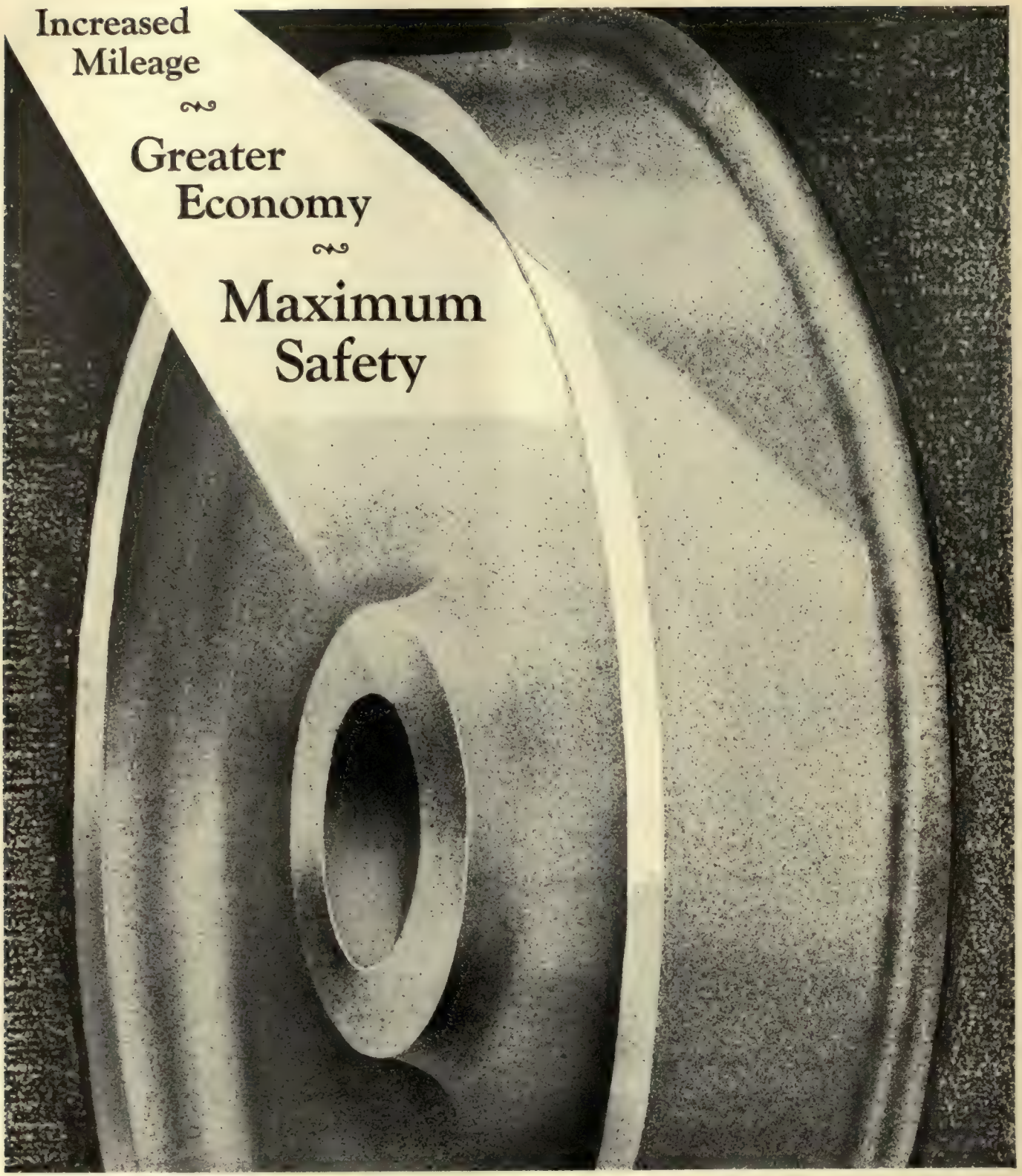
DETROIT, MICHIGAN

Manufacturers of Spray Booths and Exhaust Stacks, Industrial Drying Ovens and Blow Pipe Systems.

MAHON

SPRAY BOOTHS & EXHAUST STACKS

DESIGNED FOR FIRE SAFETY



CARNEGIE
WROUGHT STEEL
WHEELS

Product of CARNEGIE STEEL COMPANY, Pittsburgh, Pa.—*Subsidiary of United States Steel Corporation* 36

ANDERSON LINE MATERIAL





the TIME TESTED Overhead Construction

From the very beginning of the electric railway industry, A. & J. M. Anderson have been known for the high quality of Line Material which they supply.

And by constantly introducing new products which help railway operating men with their problems, this company has built up an extensive and varied line of overhead construction material. Hence from one source, you can purchase many of the items of Line Material which you require.

At the right is a partial list of ANDERSON TIME TESTED Line Material. From every item, you may be sure of long life and dependability. More than 40 years of specializing in Line Material are back of every product.

Large or small orders of standard material can be shipped promptly from stock. Whatever your requirements—write us today.

Bulletin No. 39 contains over one hundred pages; it illustrates and describes hundreds of different items. A copy of this comprehensive catalog will be sent on request.

SUSPENSIONS

Cap and Cone
Armored
Straight Line
Single and Double Curve
Car Barn: Strain
Hinged Bracket Arm
Twin
Straight Line
Single and Double Curve
Round Top
Straight Line
Single and Double Curve
Hinged Bracket Arm
West End
Straight Line
Single and Double Curve
Hinged Bracket Arm
Boston Twin
Straight Line
Single and Double Curve
Strain
Ceiling or Trough
Types B, C, E, F, G.
With removable insulated bolt:—
Types H, I, J.
Insulated Bolts

EARS

Straight Line for Round, Grooved or Figure 8 Wire.
Double Center
Feeder Ears
Splicing Ears
Half Strain
Double Strain
Clamp
Mechanical
Splicing Sleeves
Feeder Cable Splicers
Wire Connectors
Strain Plates
Wire Protecting Sleeves

FROGS

Bronze
Malleable Iron
Two, four and six pull-offs
In any degree, right and left hand
High Speed
With and without removable ears
Frog wearing plates

CROSSINGS

Bronze
Malleable Iron
Steel
Insulated
Uninsulated
Adjustable
Rigid
With and without removable ears
Overhead Conductor Bar Construction

YOKES

Feed in
Feeder Plug
Straight Line
Single and Double Curve
Swivel Strain
Double Trolley Wire

INSULATORS

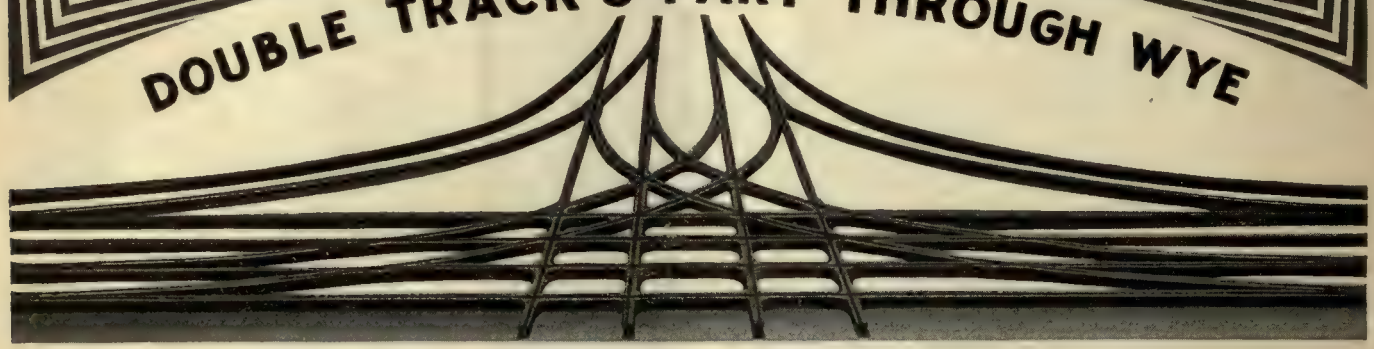
Wood Strain
Elephant Strain
Giant Strain
Globe Strain
Porcelain
Feed Wire
Feeder Tap
Brooklyn
Turnbuckle
Third Rail Section
Single and Double Beam
Automatic
High Speed
Split Spools
Solid Spools
Overhead material for Bridges
Line Material for Cranes
Sectionalizing Switches
Trolley Wheels
Sleet Wheels and Cutters
Harps
Pole Bands
Eye Bolts
Insulator Pins
Tools for installing overhead material

Albert & J. M. Anderson Manufacturing Co.

289-305 A Street, Boston, Mass.

New York Chicago Philadelphia London

When Layouts are Complex LOOK TO — LORAIN!



For the Community Traction Co., Toledo, Ohio.

WHEN car wheels pass over this trackwork, they have a continuous flange bearing through the crossings. Approaches to the flangeway intersections are gradual. These two features of construction eliminate the usual pounding noise where the guard rail is of ordinary depth and the approaches are short.

This double track 3-part through wye is constructed of 7-inch guard rail Standard Section Lorain 140 No. 468 and corresponding flange bearing rail 150 No. 512. The tongue switches are of manganese steel. Mates, frogs and crossings are of iron-bound hard centre construction with chrome nickel steel center plates.

LORAIN can meet any street railway requirement from the most complicated layout to a switch tongue lock-box; tongue switches, mates, frogs, crossings, etc., either to girder rail or standard tee rail sections. *Investigate our ability to serve you.*

Lorain

GIRDER RAILS
GIRDER GUARD RAILS
PLAIN GIRDER RAILS
RAIL JOINTS AND TRACK ACCESSORIES
EXPANSION JOINTS FOR ELECTRICALLY WELDED TRACK
SPECIAL TRACKWORK
SWITCHES, FROGS AND CROSSINGS
in
Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail.

THE LORAIN STEEL COMPANY

JOHNSTOWN, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

American Bridge Company · American Sheet and Tin Plate Company · American Steel and Wire Company · Carnegie Steel Company · Cyclone Fence Company · Federal Shipbuilding and Dry Dock Company · Illinois Steel Company · Minnesota Steel Company · National Tube Company · The Lorain Steel Company · Tennessee Coal, Iron & R. R. Company · Universal Portland Cement Company

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

Lorain Sales Offices—ATLANTA CHICAGO CLEVELAND DALLAS NEW YORK PHILADELPHIA PITTSBURGH



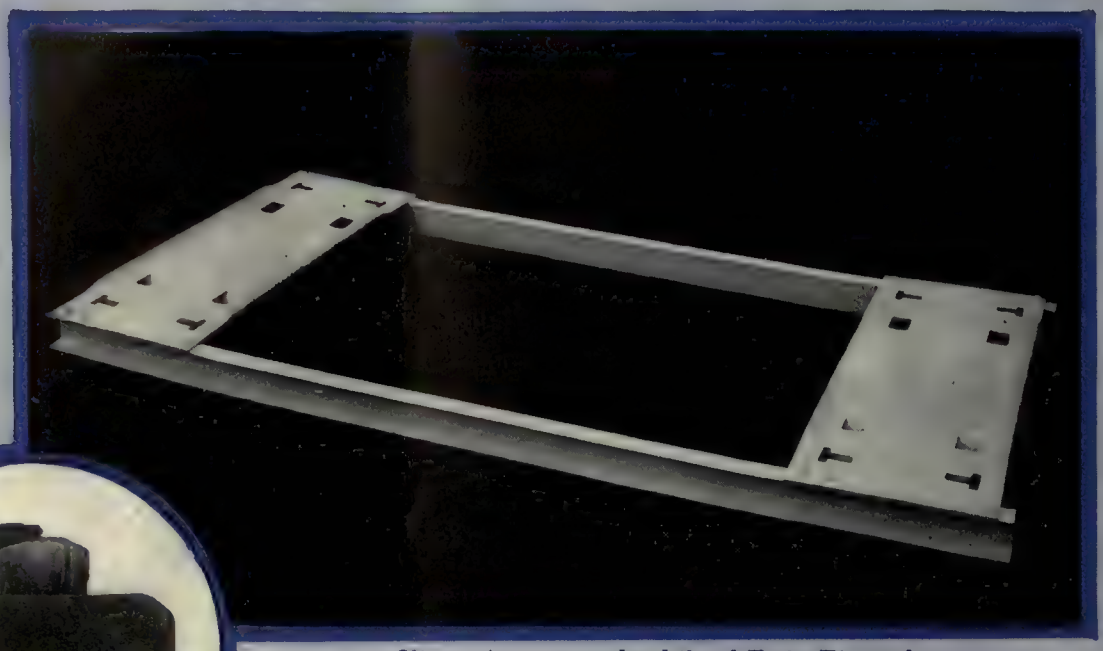
When You Plan

1930 Paved Track Construction

Remember there is only *one way* to put track in the street *exactly* like the plan

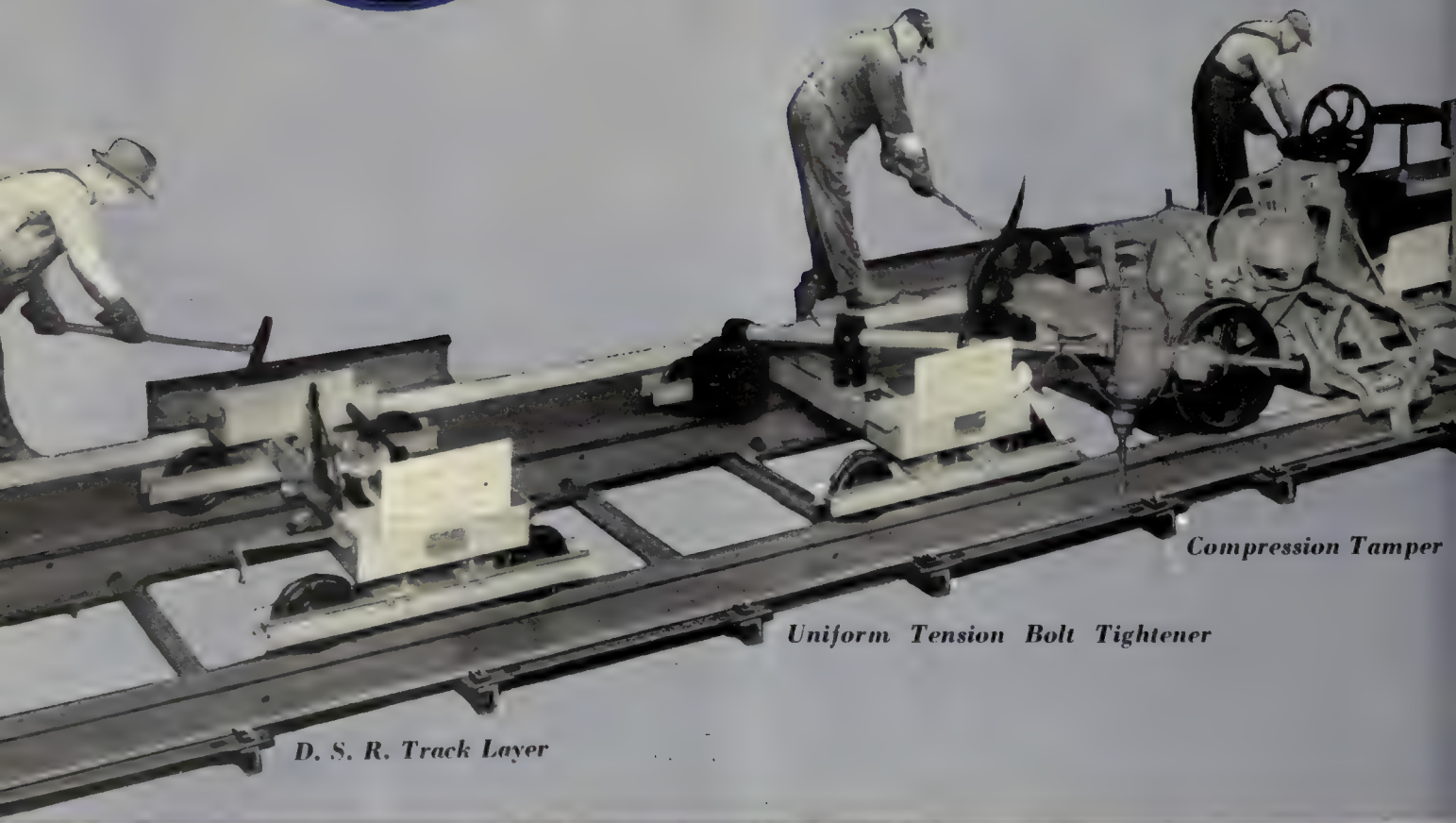
***Uniform Mechanical Methods and* STEEL TWIN TIES**

To Put The Track In The





View of new standard Steel Twin Tie and —at left—the Precision Rail Clip.



Compression Tamper

Uniform Tension Bolt Tightener

D. S. R. Track Layer

INTERNATIONAL STEEL

Street Exactly Like The Plan

Use Uniform Mechanical Methods and Steel Twin Ties

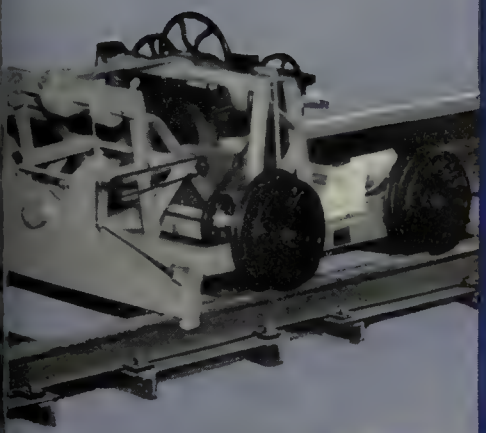
Uniform **results in constructing paved track are what every operator wants. For *uniform* quality and results International machine methods combined with Steel Twin Ties have no counterpart in paved track construction. It is the only completely controlled, economical method of building paved track—regardless of whether the job is large or small.**

The modernized standard Steel Twin Tie has 8 plate anchors twisted into the concrete. It is furnished with the precision type rail clip that is *rolled, sawed, drilled and machined,* and with heat treated high tensile bolts.

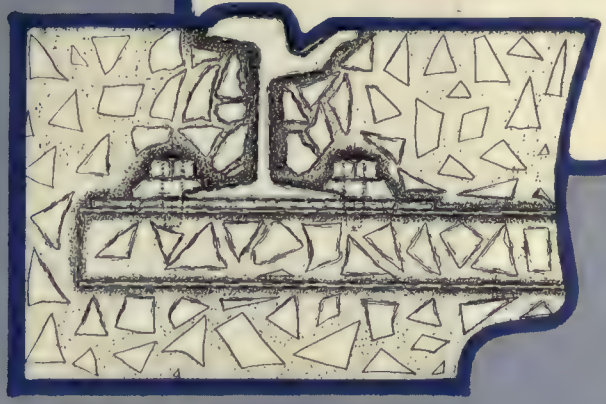
Install these Steel Twin Ties with the four machines that comprise the International Mechanical Method —Track Layer, Bolt Tightener, Compression Tamper and the marvellous Mortar-Flow Pulsator that gives a 300% better bond between rail, tie and concrete.

Then you *know* you have track in the street exactly like the plan.

Let us demonstrate International Mechanical Track laying methods, submit prices on ties, and terms on machine equipment. Write.



Mortar-Flow" Pulsator



Vibrating the track structure at 5500 vibrations per minute — with the "Mortar-Flow" Pulsator — gives 300% better bond between steel, rail, and concrete.

TIE COMPANY CLEVELAND OHIO

Here's a labor saver for you!

The Differential Electric Locomotive Crane Car

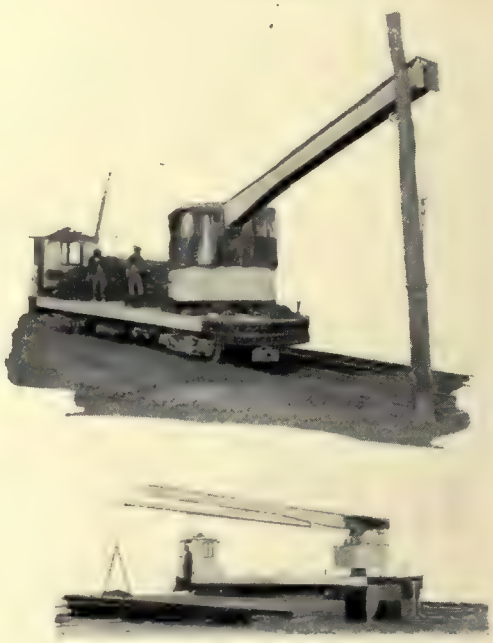
Saves Time and Labor Reduces Accidents



Capacity

5 Tons at radii up to 26 feet.

2 Tons at radii from 26 feet to 44 feet.



Economically Performs Many Operations:

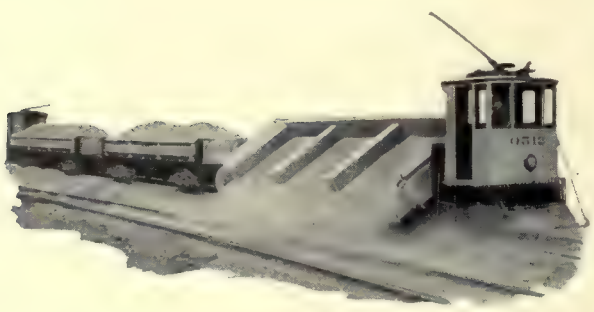
Handling rails
Handling special track work
Setting poles
Handling bridge timbers
Magnet loading
All kinds of loading and unloading operations

One Man Operation:

The crane operator sits in a revolving turret. From his seat he can conveniently and safely control the movement of the car along the track as well as control the four distinct crane movements.

Safety:

The machine is speedy but safe. It conforms to Electric Railway clearances. Never blocks traffic on adjacent tracks.



The DIFFERENTIAL METHOD cuts construction costs

The Differential Electric Dump Car.
The Differential Body—3-way Dump
The Clark Concrete Breaker
The Differential Electric Locomotive Crane Car

Adopt the Differential Method for Better Track and Lower Costs

The DIFFERENTIAL STEEL CAR CO., Findlay, Ohio, U. S. A.

GOOD LUBRICATION

keeps these Buses young

Some of the 28 buses and trucks operated by the Charles H. Vollmer Motor Bus Lines of Amsterdam, N. Y. This fleet uses only Socony Gasoline and Aircraft Oil.

BUSES wear out in parts. Sometimes the parts become worn out through long service. All too often they wear out early because of incorrect lubrication or unsuitable lubricants.

Socony Aircraft Oil and Socony Gear Compound and Greases are keeping many buses young in New York and New England by providing their moving parts with correct lubrication.

The Charles H. Vollmer Motor Bus Lines, for instance, have found that Socony lubricants give their equipment longer life, and consequently have reduced their maintenance costs.

We believe we can show you that Socony lubricants will do the same thing for your buses.

SOCONY

Gasoline · Motor Oil · Aircraft Oil

Special Gasoline plus Ethyl



STANDARD OIL COMPANY OF NEW YORK

Is a saving of
$180.00 per Bus–per year
Interesting to you?



"Tests recently completed on a line completely equipped with Economy Gasoline Meters show that a saving of 10% to 17% IN GASOLINE can be obtained through the use of these meters.

"This would mean a saving in FUEL COST of $180.00 per bus per year, or $.006 per bus mile.

"THESE METERS would pay for themselves in 3 to 6 months' time in gasoline savings."

ECONOMY GASOLINE METERS

WILL Give you individual fuel consumption records, by men, by vehicles and by routes.

WILL Tell you which drivers are operating their busses correctly.

WILL Cut your fuel costs by encouraging correct operation.

WILL Give you data on which to base educational campaigns for drivers.

WILL Indicate the condition of your equipment day by day, trip by trip.

WILL Assist your Mechanical Department to properly maintain your equipment.

WILL Cut your maintainance costs by indicating defective equipment.

WILL Enable you to determine proper carburetor adjustment.

WILL Assist you in estimating the merits of various auxiliary devices.

WILL Serve as a daily check upon the quality of your gasoline.

WILL Enable you to fit most efficient vehicle to proper service.

WILL Help you to determine most efficient schedules.

WILL Indicate amount of fuel withdrawn from tank for power.

WILL Eliminate waste of gasoline by overflowing tank when refilling.

WILL *Give you an accurate measure of your fuel costs by men, by routes, by busses, by trips.*

Let us send you the details of this new device and how it works.

Economy Electric Devices Company

37 W. VAN BUREN ST., CHICAGO

Sangamo Economy Watthour Meters
Peter Smith Heaters

Haskelite and Plymetl
Peter Smith Reverse Flow Car Ventilating System

Lang Bus Bodies
Economy Gasoline Vehicle Meters



NATIONAL
SHELBY
TROLLEY POLES

Minimum weight with maximum strength

TO keep daily service at the highest peak of efficiency means the elimination of delays or traffic tie-ups frequently caused by trolley poles failing to hold up in service. Reliable poles, therefore, are a good investment. Their selection should be based on design and tests that prove their fitness for the character of service in which they will be used.

NATIONAL-SHELBY Poles are designed with sufficient strength to meet all service requirements and yet not be of excessive weight. A special form of reinforcement at the proper place gives the pole great strength while the grade of steel used and a special heat treatment after drawing gives a high elastic limit and assures long life and satisfactory service.

In addition, every NATIONAL-SHELBY Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. This type of test is especially important in that it minimizes the possibility of any defective pole being installed—thereby helping to cut the cost of trolley pole service before it begins. A description of this test and complete information about these poles will be sent on request.

NATIONAL TUBE COMPANY
Frick Building, Pittsburgh, Pa.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION
PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:
AMERICAN BRIDGE COMPANY · AMERICAN SHEET AND TIN PLATE COMPANY · AMERICAN STEEL AND WIRE COMPANY · CARNEGIE STEEL COMPANY · CYCLONE FENCE COMPANY · FEDERAL SHIPBUILDING AND DRY DOCK COMPANY · ILLINOIS STEEL COMPANY · MINNESOTA STEEL COMPANY · NATIONAL TUBE COMPANY · THE LORAIN STEEL COMPANY · TENNESSEE COAL, IRON & R. R. COMPANY · UNIVERSAL PORTLAND CEMENT COMPANY
Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

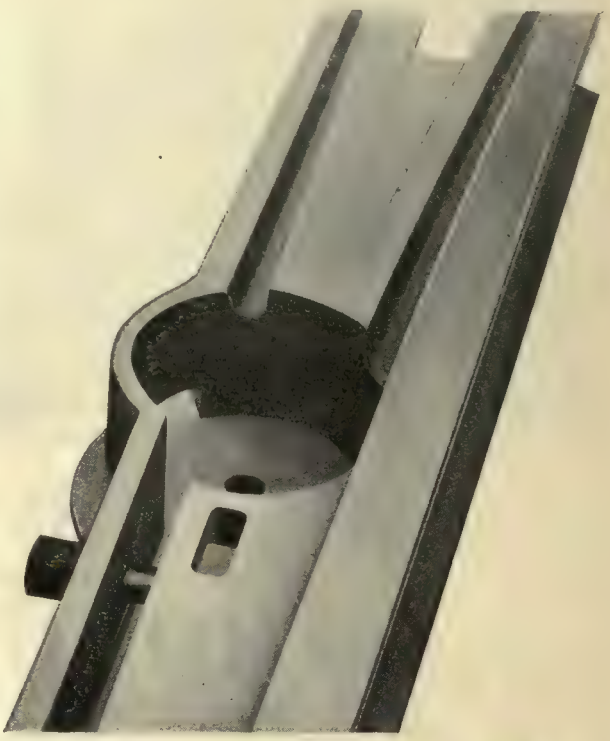
THE NEW WHARTON SWITCH

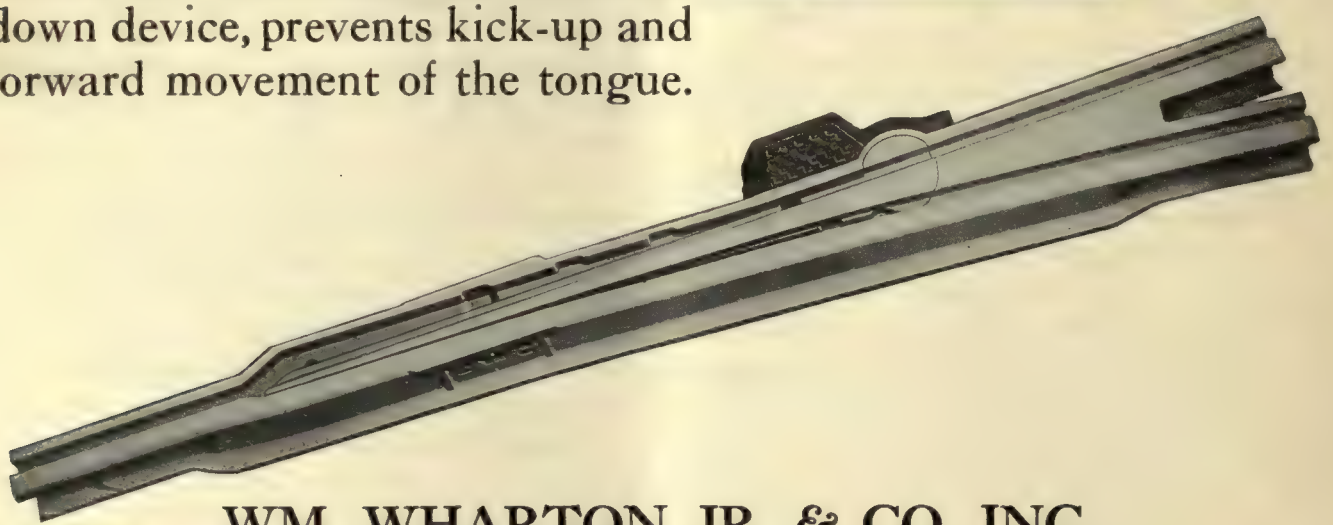
Designed For Minimum Maintenance

...no kick-up...no moving forward no holding-down device

The Wharton Flexible Wall Switch has a heel tightening device based on the principle of a split collar. By means of a bolt the wall is flexed or drawn in until it hugs the tongue heel; thus all play caused by wear is taken up. The nut of this bolt is located in the drain box and is readily accessible.

The tongue pin is 9½" in diameter and is 6" deep. This construction eliminates a holding-down device, prevents kick-up and forward movement of the tongue.





WM. WHARTON JR. & CO. INC.

EASTON, PA.

NEW YORK
PHILADELPHIA
BOSTON
PITTSBURGH
SAN FRANCISCO
EL PASO
HOUSTON
CHICAGO
SCRANTON
MONTREAL

"Standard" Steel Wheels Are Safer



PRODUCTS

Rolled Steel Wheels

Armature Shafts

Axles and Springs

Modern High Speed Electric Transportation needs the superior safety and economy of "Standard" Wrought Steel Wheels and Forged Steel Axles.

STANDARD STEEL WORKS COMPANY

CHICAGO
NEW YORK
RICHMOND

PHILADELPHIA, PA.
WORKS: BURNHAM, PA.

ST. LOUIS
PORTLAND
SAN FRANCISCO

PHONO-ELECTRIC

PHONO-HI-STRENGTH

PHONO-HI-CONDUCTIVITY

BRIDGEPORT BRASS COMPANY is pleased to announce to the many users of Bridgeport Phono-Alloys the appointment of General Cable Corporation as our sole and exclusive agent in the United States to draw wire from Phono-Alloys and to sell such wire and stranded cable.

This arrangement offers a three-fold advantage to all users of these famous Bridgeport Brass Company products:

(1) Ready availability of Phono-Alloy products through well-equipped and strategically located plants, with large capacity for drawing wire and stranding cable . . .

(2) Technical assistance, gladly given when needed, by a staff of competent cable engineers, unbiased in their recommendations . . .

(3) The co-operation of a nation-wide sales organization thoroughly versed in the practical application of Phono-Alloys to the transmission of electrical energy.

The Bridgeport Brass Company will continue, as heretofore, the manufacture and sale of Phono products, thus making available the combined engineering counsel and manufacturing facilities of both companies for the benefit of users of Phono-Electric, Phono-Hi-Strength, and Phono-Hi-Conductivity wires and stranded cables.

The Bridgeport Brass Company feels that the appointment of the General Cable Company as outlined above will be welcomed throughout the entire electrical industry, further perfecting, as it does, the service obtainable by standardizing on Phono-Alloys.

BRIDGEPORT BRASS COMPANY

"PHONO" ALLOYS FOR OVER THIRTY YEARS

BRIDGEPORT, CONNECTICUT

PHONO-ELECTRIC

PHONO-HI-STRENGTH

PHONO-HI-CONDUCTIVITY

OF particular significance is the appointment of General Cable Corporation by the Bridgeport Brass Company as its sole and exclusive agent in the United States to draw wire from Phono-Alloys and to sell such wire and stranded cable.

For, in the addition of bronze Phono-Alloys to its complete line of electric wire and cable products, General Cable Corporation takes a forward step in broadening its scope of service to the entire electrical industry. The appointment is truly indicative of our earnest desire to provide a complete, dependable source of supply for all types of electrical wires and cables—and thus to be able to weigh our customers' requirements with open minds, uninfluenced by manufacturing limitations. The soundness of this policy and the benefits derived from it by all wire and cable users will, we believe, be quickly realized by the whole industry.

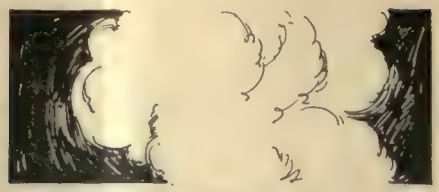
Adequate manufacturing facilities and a large sales and engineering organization, ably represented in the principal cities of the United States, are now available to all users of Phono-Alloys.

Although Bridgeport Brass Company will continue the manufacture and sale of this material, wires and cables manufactured from Phono-Electric, Phono-Hi-Strength, and Phono-Hi-Conductivity alloys will henceforth be obtainable through all of the divisions of General Cable Corporation.

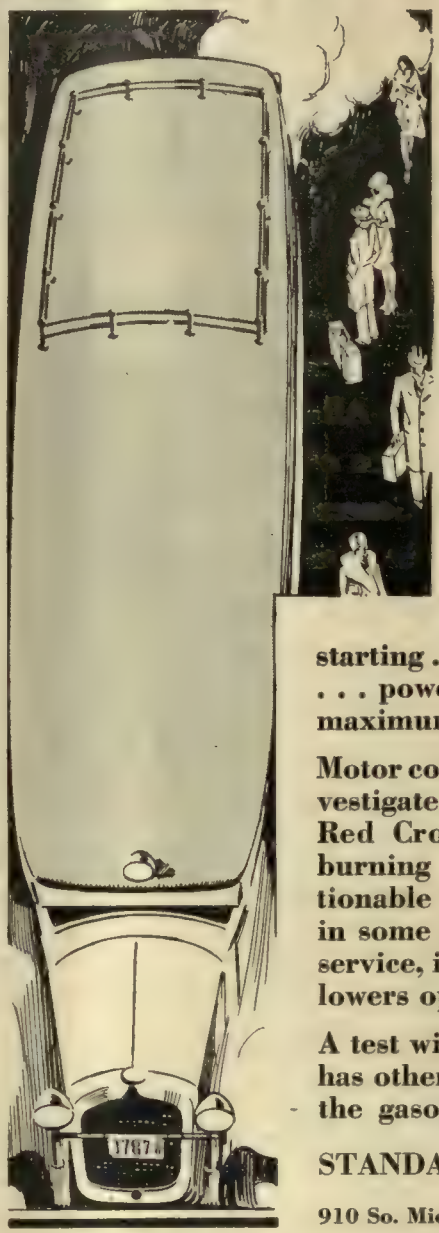
STANDARD UNDERGROUND CABLE COMPANY

DIVISION OF GENERAL CABLE CORPORATION

PERTH AMBOY, NEW JERSEY



MOTOR COACH FUMES ARE COSTLY



THE pedestrians that your motor coaches pass at the street corners . . . the motorists that follow your buses on the highway . . . may be prospective passengers.

To subject these potential customers to the stifling fumes produced by gasoline with high sulphur content is not good business . . . and it can easily be avoided. Red Crown Gasoline, pure and practically free from sulphur, does not produce objectionable odors.

As a motor fuel Red Crown Gasoline ranks at the top. It possesses every characteristic that a superior gasoline must possess . . . quick starting . . . rapid acceleration . . . power . . . ability to give maximum mileage.

Motor coach operators who investigate motor fuel find that Red Crown, in addition to burning without the objectionable odors so noticeable in some gasolines, speeds up service, increases mileage and lowers operating costs.

A test will convince you, as it has others, that Red Crown is the gasoline for you to use.

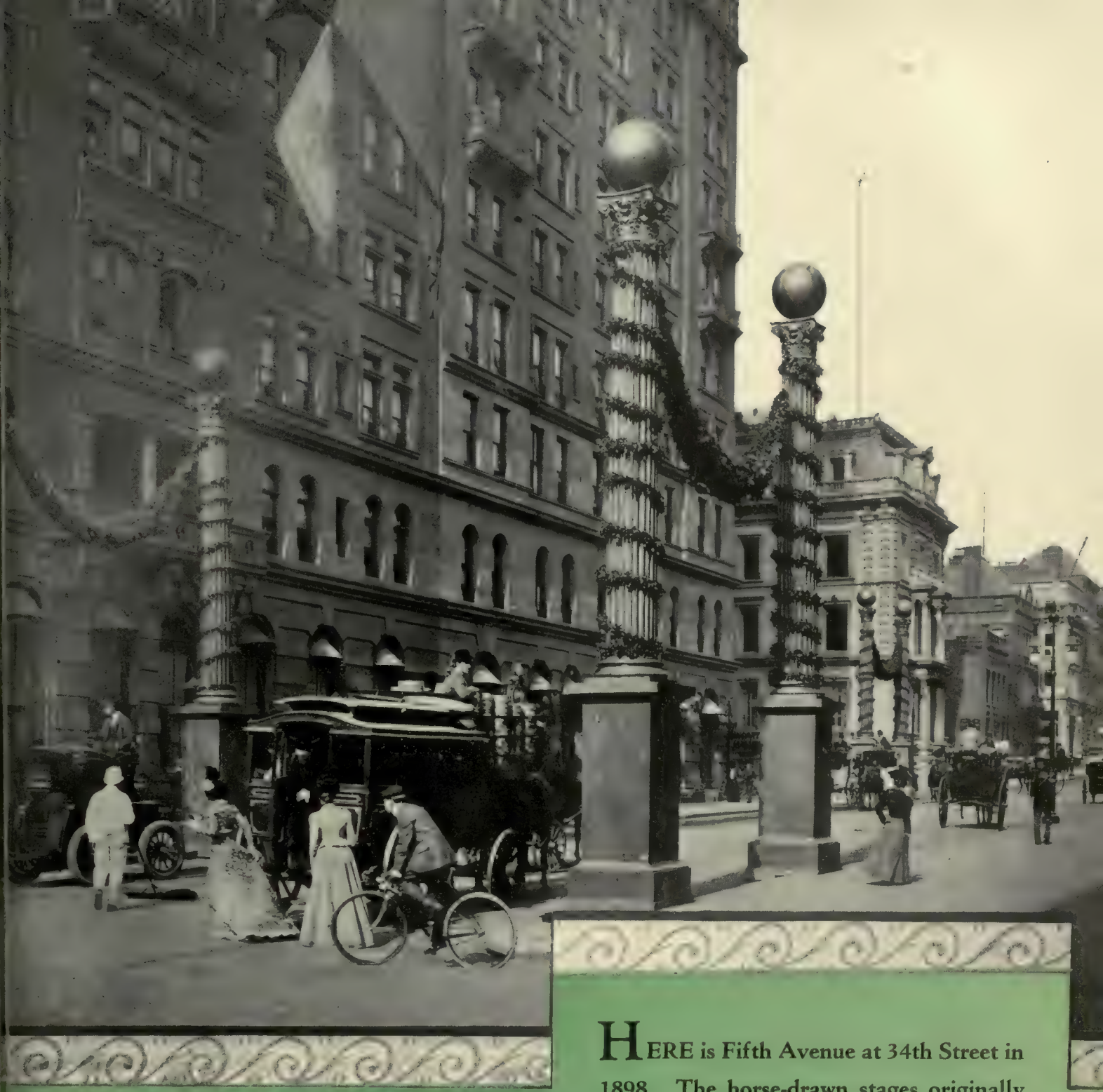
STANDARD OIL COMPANY
(Indiana)
910 So. Michigan Ave. Chicago, Ill.

RED CROWN GASOLINE

RED CROWN GASOLINE

Davenport	Duluth	Green Bay	Kansas City	Milwaukee	Quincy	St. Joseph
Decatur	Evansville	Huron	La Crosse	Minneapolis	Saginaw	St. Louis
Des Moines	Fargo	Indianapolis	Mankato	Minot	Sioux City	Wichita
Detroit	Grand Rapids	Joliet	Mason City	Peoria	South Bend	

825



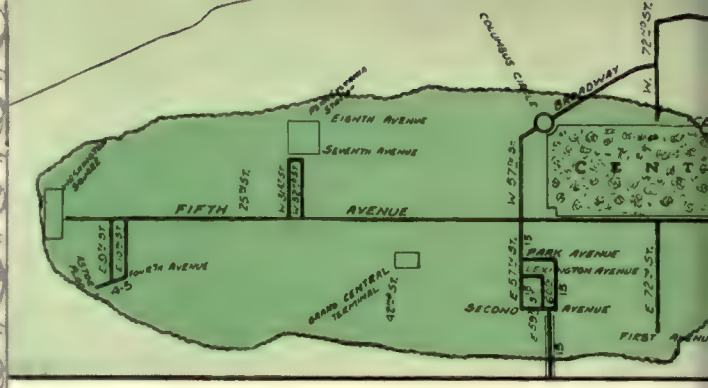
How the Old Town Has Changed

HERE is Fifth Avenue at 34th Street in 1898. The horse-drawn stages originally installed in 1885 "to prevent an invasion of the Avenue by horse cars" long ago made way for "America's first fleet of gasoline propelled coaches, imported from Europe." These too are gone. Now Yellow Coaches serve Fifth Avenue . . . *the most famous thoroughfare in American history and probably the most severe city-service route in this country.*

1885 1930



Easter on the Avenue at 50th Street in 1900. There was no annoying automobile competition in these gay days—but just look at the 'ansoms.



From Washington Square to 72nd Street is the most congested three miles of bus route in America.



The first buses to run on Fifth Avenue were imported from Europe.

The Most Famous—*and Difficult* City-Service Route in America

The history of bus operation in America began 45 years ago in New York—on Fifth Avenue—known in pioneer times as "The Middle Road."

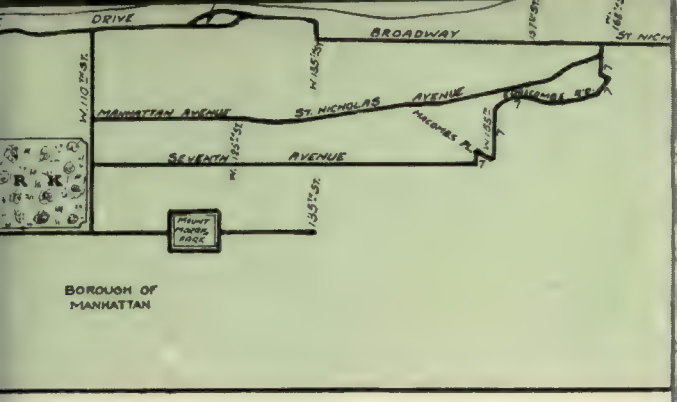
Its forebear was the horse-drawn stage. The Fifth Avenue Transportation Company, Limited, was organized in 1885 to operate a horse-drawn stage line. The company grew. Ten years later its equipment consisted of 71 stages and 360 horses.

Then came a reorganization. History tells us that the new owners in 1899 began experimenting with "gasoline and electric propelled buses" but that "the first types utilizing a gasoline engine and an electric transmission" were found impractical.

Then came experiments conducted with a single gasoline bus—the DeDion Bouton imported from Europe. Fourteen others were ordered in 1907. Two months later the horse equipment was sold at auction. The fleet of buses grew steadily. Motor coach operation on Fifth Avenue had come to stay.

Then came the world war. Coaches could no longer

Fifth Avenue Coach buys 100 more





The latest double deck Yellow Coach of the type just ordered.



Fifth Avenue at 44th Street today. For three miles it's like this —the most congested stretch of route in America

be imported and the company was forced to manufacture their own equipment to meet their specialized requirements. Then came Yellow Coach—one of America's first bus manufacturers—with equipment specially designed and developed for large capacity passenger transportation. Fifth Avenue has been standardizing on Yellow ever since.

Today the Fifth Avenue Coach Company operates a maximum total of 440 buses—with 100 more Yellows now on order to replace equipment of older type.

There is no more severe or grueling test of equipment than double deck operation on Fifth Avenue. Here, along this world-famous artery, buses operate over a longer congested route than is found in any motor coach operation in America. Congestion! From Washington Square to 72nd Street a dense packed mass of vehicles and surging humanity stretches solidly ahead for three grueling miles. Yet under the scheduled headway *a bus every 16½ seconds* must work its way through.

The drag and strain on machinery is tremendous. During practically all hours of the day the traffic is packed, jammed. When it moves it moves as a unit. Frequent traffic stops pile up the buses. Equipment crawls, stops, starts, stops and starts again. One mile—two—three—there is no relief in this congested area.

Fifth Avenue Coach Company operates 32.23 miles of route.

11,385,574 revenue bus miles were piled up during the year ending June 30, 1929.

66,236,312 revenue and transfer passengers were carried.

618,181,395 active seat miles were furnished.

Yellow Coaches



Interesting Facts

The Fifth Avenue Coach Company is the pioneer bus operator of America.

The company obtained its charter in 1885 and operated horse stages on Fifth Avenue until 1907.

The first experiments with gasoline buses in America were conducted on Fifth Avenue by this company.

The first successful gasoline bus was imported from Europe in 1906.

The company has an operating fleet of 440 coaches—practically all double deck equipment—and has just placed an order for 100 additional Yellow Chassis.

Year Ending June, 1929

Passengers carried	66,236,312
Miles of route	32.23
Revenue bus miles	11,385,574
Drivers and conductors	1,300
Garages and shops	4

1,300 drivers and conductors are on the payroll and four main and service garages keep equipment in good condition.

Traffic conditions on Fifth Avenue hold no place for motor coaches that cannot stand the gaff. These big, double deck coaches *must* keep moving for a breakdown would jam traffic instantly.

The Company' years of experience along this ruthless proving ground, proves that Yellow Coaches successfully meet the abnormal conditions encountered.

Because of their performance, 100 "Type Z" Yellow chassis, for double deck bodies, have just been ordered by this pioneer operator and will soon go into service on the most famous, *and difficult,* city-service route in America — *Fifth Avenue in New York.*

GENERAL MOTORS TRUCK COMPANY, PONTIAC, MICH.

Subsidiary of Yellow Truck & Coach Mfg. Company

Add definite sales value--
ART RATTAN
Seats

STREET car manufacturers who install Art Rattan seats find that they add definite sales value to their products. The qualities that made Art Rattan seats outstanding in the bus field is repeated among car builders.

The greater comfort, smart tailoring, deep, inviting upholstery and sturdy frames result from years of experience in building Art Rattan Seats.

Operators insist on comfort and style. Art Rattan Seats meet their demands.



ART RATTAN WORKS, INC.

Builders of De Luxe Street Car Seats

CLEVELAND, OHIO OAKLAND, CAL.

Through the McGRAW-HILL PUBLICATIONS you can tell your sales story to this broad sweep of industry and business:



Economy in distribution is a matter of intelligent weighing of markets and intensive specialization in those that are found to be most profitable. The McGraw-Hill publishing program offers not only a wide and effective advertising coverage of industry and business but facilities and experienced help in establishing efficient selling programs to which advertising, to be successful and economical, must be geared.

AMERICAN MACHINIST—A weekly publication reaching those executives of the metal-working industries who are responsible for management, production and plant operation. Circulation 17,512.**

PRODUCT ENGINEERING—A new monthly publication reaching the executives of the metal-working industries who are directly responsible for the planning of the product from the viewpoint of salability, best service in use and economy in manufacture. Over 8,000 copies of this publication are distributed monthly to the executives in charge of research, design, specification and field investigation.[1]

THE BUSINESS WEEK—A new journal of business news and interpretation. Fast, complete coverage of the news. Published weekly on a newspaper schedule. Fifteen editors—all business specialists—provide 75,000 major executives with the news they need and tell them what it means.*

SYSTEM—A monthly journal devoted to modern business management. Covers the managerial executives in large and medium-sized businesses. Circulation 70,000.

FACTORY & INDUSTRIAL MANAGEMENT—A monthly publication serving the men responsible for production and plant management policies in all major industries. A general industrial executive journal. Circulation more than 33,000.**

INDUSTRIAL ENGINEERING—A monthly publication serving the plant engineering department throughout industry on the selection, installation and maintenance of mechanical and electrical equipment, and maintenance of plant structures. Circulation 15,000.**

ENGINEERING NEWS-RECORD—A weekly publication reaching the engineering executives and contractors of the civil engineering and construction industry. Editorially covers planning, designing, construction and maintenance of buildings, bridges, highways, railroads, waterworks, irrigation, drainage and sewerage systems, etc. Circulation 30,000.**

CONSTRUCTION METHODS—A monthly pictorial of field practice and equipment read by the field-minded construction men. Covers construction, maintenance and material handling methods for general construction, highways, buildings, industrial plants, public works and utilities. Circulation 32,000.**

POWER—A weekly publication reaching those in responsible charge of power generation and attendant services in all industries. Editorially covers the functions of executive control, installation, operation, maintenance and application of power wherever it is employed. Circulation 27,535.**

AVIATION—A weekly publication serving all those engaged or actively interested in the development of the aeronautical industries . . . 20,332 copies are subscribed to by the business men of the aeronautical industries. The oldest American aeronautical magazine.*

ELECTRIC RAILWAY JOURNAL—A monthly publication reaching the managing and operating executives and engineers of city and inter-city transportation companies—electrified railways (surface, subway, elevated) and affiliated bus operations—in the U. S., Canada and throughout the World. Circulation nearly 6,000.**



CHEMICAL & METALLURGICAL ENGINEERING—A monthly publication serving the chemical engineering or process industries—a group of approximately 20 industries closely related because of common production processes. Circulation more than 13,000.**

FOOD INDUSTRIES—A monthly publication serving the manufacturing and processing of food products. Written for the production executives and technologists of the food manufacturing industries. Circulation 10,000.

COAL AGE—A monthly engineering journal reaching the executives and operating heads of the bituminous and anthracite mining industry. Devoted editorially to operating, technical and business problems. Circulation 9,383.**

ENGINEERING AND MINING JOURNAL—A national semi-monthly publication read by the executives and operating heads responsible for mining, milling, smelting and refining metals and non-metallic minerals in the United States and possessions. Editorially covers operating, technical and business problems of the industry. Circulation 7,000, concentrated in the United States and its possessions.

ENGINEERING AND MINING WORLD—An international monthly publication read by the executives and operating heads of 3,000 mining enterprises *outside* the United States and its possessions. Editorially covers operating, technical and business problems connected with mining, milling, smelting and refining of metals and non-metallic minerals. Circulation 6,300 (outside U. S. A. and possessions).

E. & M. J. METAL AND MINERAL MARKETS—A weekly publication read by metal and mineral dealers and brokers, and the major industrial metal consumers, also by the sales executives of mineral producing companies. Editorially covers metal and mineral market trends and current prices of metals and minerals. Circulation 1,500.

ELECTRICAL WORLD—A weekly publication reaching executives and engineers of central stations and electrical manufacturers, electrical engineers of industrial manufacturers, consulting engineers, etc. Circulation more than 18,500.**

ELECTRICAL MERCHANDISING—A monthly publication reaching appliance departments of central stations, sales executives of electrical appliance manufacturers, wholesalers and dealers of all classes handling electrical merchandise in volume. Circulation more than 17,000.**

RADIO RETAILING—A monthly publication serving retailers, wholesalers and manufacturers—radio, music, hardware, sport, department stores, etc. The only ABC-ABP paper in the radio or music trade field. Circulation more than 26,000.**

ELECTRICAL WEST—A monthly publication serving central station executives, appliance dealers, jobbers, contractors and contractor-dealers, in the 11 Western and Pacific Coast states. Circulation nearly 6,000.**

BUS TRANSPORTATION—A monthly publication read by the managing, operating and maintenance executives and engineers of common carrier bus operating companies throughout the United States. Circulation nearly 10,000.**

TEXTILE WORLD—A weekly publication serving all branches of textile manufacturing—cotton, wool, silk and rayon. Edited for the administrative and production executives. One of the earliest industrial publications (established 1868) and the world's accepted textile authority. Circulation nearly 9,000.**

** Member of Audit Bureau of Circulations and Associated Business Papers
* Member of Audit Bureau of Circulations
[1] First issue appears in January, 1930

McGRAW-HILL PUBLISHING COMPANY, INC.

NEW YORK CHICAGO PHILADELPHIA WASHINGTON
DETROIT ST. LOUIS CLEVELAND BOSTON
SAN FRANCISCO GREENVILLE LONDON

SPEED

GETAWAY

LESS WEIGHT

NO NOISE

"TOOL STEEL" GEAR DRIVE

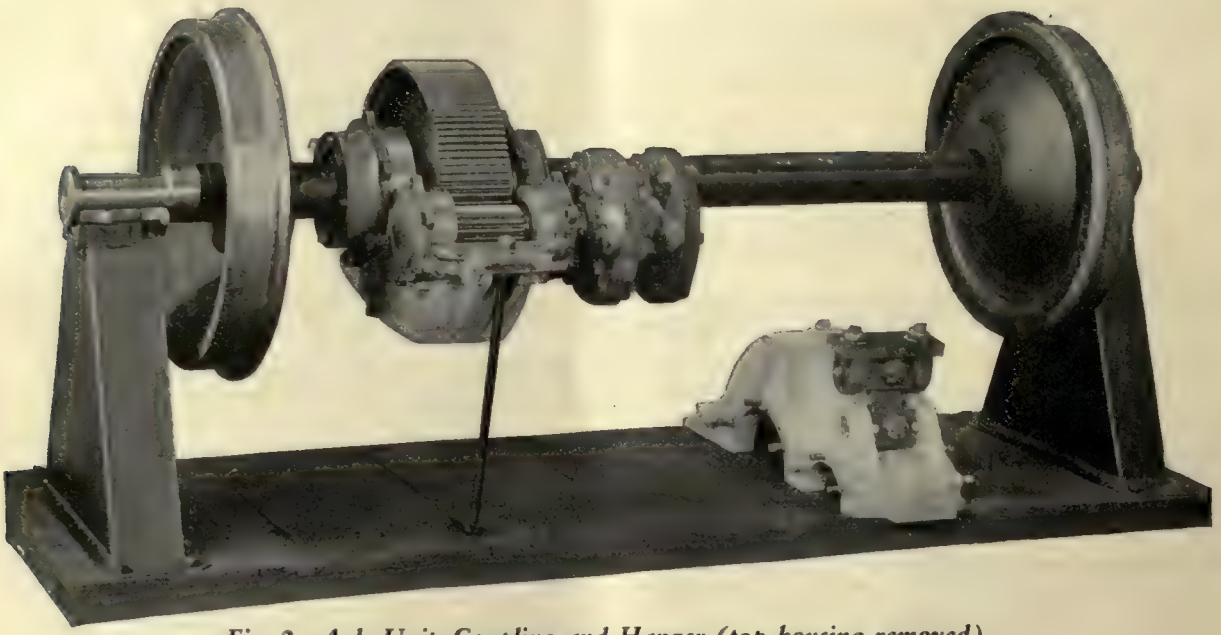


Fig. 2—Axle Unit, Coupling and Hanger (top housing removed)

THIS DRIVE HAS MADE GOOD

Bulletin upon Request

The Tool Steel Gear & Pinion Co.
Elmwood Place, Cincinnati, Ohio



DUNDEE "A" STICKS IN PLACE

DUNDEE "A" friction tape is popular with electrical workers because it sticks quickly and therefore is easy to use. Foremen and superintendents like it because it does not dry out and therefore it stays in place.

Dundee "B" is a true friction tape. The adhesive compound is not merely spread on the cotton fabric but is calendered under heavy pressure into every part of the cloth. For that reason the fabric and the adhesive never separate into layers.

In spite of the care used in its manufacture, it is moderately priced. Specify it on your next order.



THE OKONITE COMPANY

Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC.

Factories: Passaic, N. J. Paterson, N. J

SALES OFFICES:

NEW YORK CHICAGO PITTSBURGH ST. LOUIS BOSTON ATLANTA
BIRMINGHAM SAN FRANCISCO LOS ANGELES SEATTLE DALLAS

Novelty Electric Co., Philadelphia, Pa
F. D. Lawrence Electric Co., Cincinnati, O.

Canadian Representatives:
Engineering Materials, Limited, Montreal

Cuban Representatives:
Victor G. Mendoza Co., Havana

OKONITE PRODUCTS

Okonite Insulated Wires and Cables

Varnished Cambric Cables

Okonite Insulating Tape

Manson & Dundee Friction Tapes

Okocord

Okoloom

OKONITE-CALLENDER PRODUCTS

Impregnated Paper Cables

Super-tension Cables

Splicing Materials



the harder it blows the better they burn

Convert your Danger Zones into Safety Zones

Make it a thorough job. You can't afford to be half-hearted in your protection efforts. TOLEDO TORCHES are ***not just another means*** of protecting your construction work. They are the ***only means*** that will ***fully protect*** you from accident losses.



Toledo Torches are free from theft and breakage.

They are always ready for service without attention.

Our ***patented*** Economy Burner cuts the oil cost in half and insures perfect performance.

Look for our name on each

TOLEDO ★ TORCH

The Toledo Pressed Steel Co.
Toledo, Ohio

COLUMBIA

Railway and Utility Supplies

Castings — Grey Iron.
Brass and Aluminum

Forgings
Special Machinery
and Patterns

Machine and Sheet
Metal Work

Armature and
Field Coils.

The Columbia Machine Works *and M. I. Co.*

265 Chestnut St., corner Atlantic Ave.,
Brooklyn, New York

News....

brief, late news flashes for the electric railway industry

To supplement the service of the regular monthly issues of *Electric Railway Journal*, a separate NEWS service appears on thirty-nine Saturdays during the year. This supplement keeps you in touch with court decisions . . . fare increases . . . new ordinances . . . association meetings . . . financial statements . . . equipment purchases.

Subscription Price: For all countries taking domestic subscription rate, $2. Sold in combination with the monthly edition of *Electric Railway Journal* for $4 a year domestic rate.

STRUCTURAL STEEL

Fabricated STEEL STRUCTURES

for every purpose



PROGRESS PICTURE, POWER STATION

■

Fabricated Structural Steel by AMERICAN BRIDGE COMPANY

Subsidiary of United States Steel Corporation

■

Manufacturers of STEEL STRUCTURES

of all classes, particularly

BRIDGES AND BUILDINGS

Roof Trusses, Columns, Girders, Towers and Poles, etc.

■

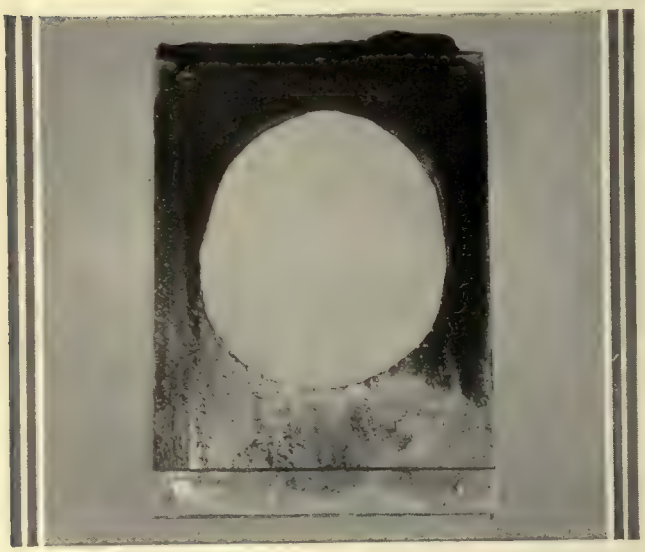
General Office: 71 BROADWAY, NEW YORK, N. Y.

Contracting Offices in Principal Cities

The Texas Company has solved the problem of car journal lubrication



THE TEXACO OIL SEAL



USUAL FELT LINED WOODEN DUST GUARD

A new oil seal has been devised which for the first time effectively prevents leakage of lubricant from the journal box and the access of abrasive dust and water.

It is an important part of a new Texaco System of Lubrication.

Notice the illustration above. It shows one of the oil seals after two years actual service—still in perfect condition.

Contrast this with the illustration of the felt-lined wooden dust guard. A few months service renders these dust guards entirely ineffective.

The Texas Company is prepared to supply the new Texaco Oil Seals and explain fully the money-saving principle of Texaco Lovis Oil and the Texaco System of Lubrication. Write The Texas Company, Dept. L.

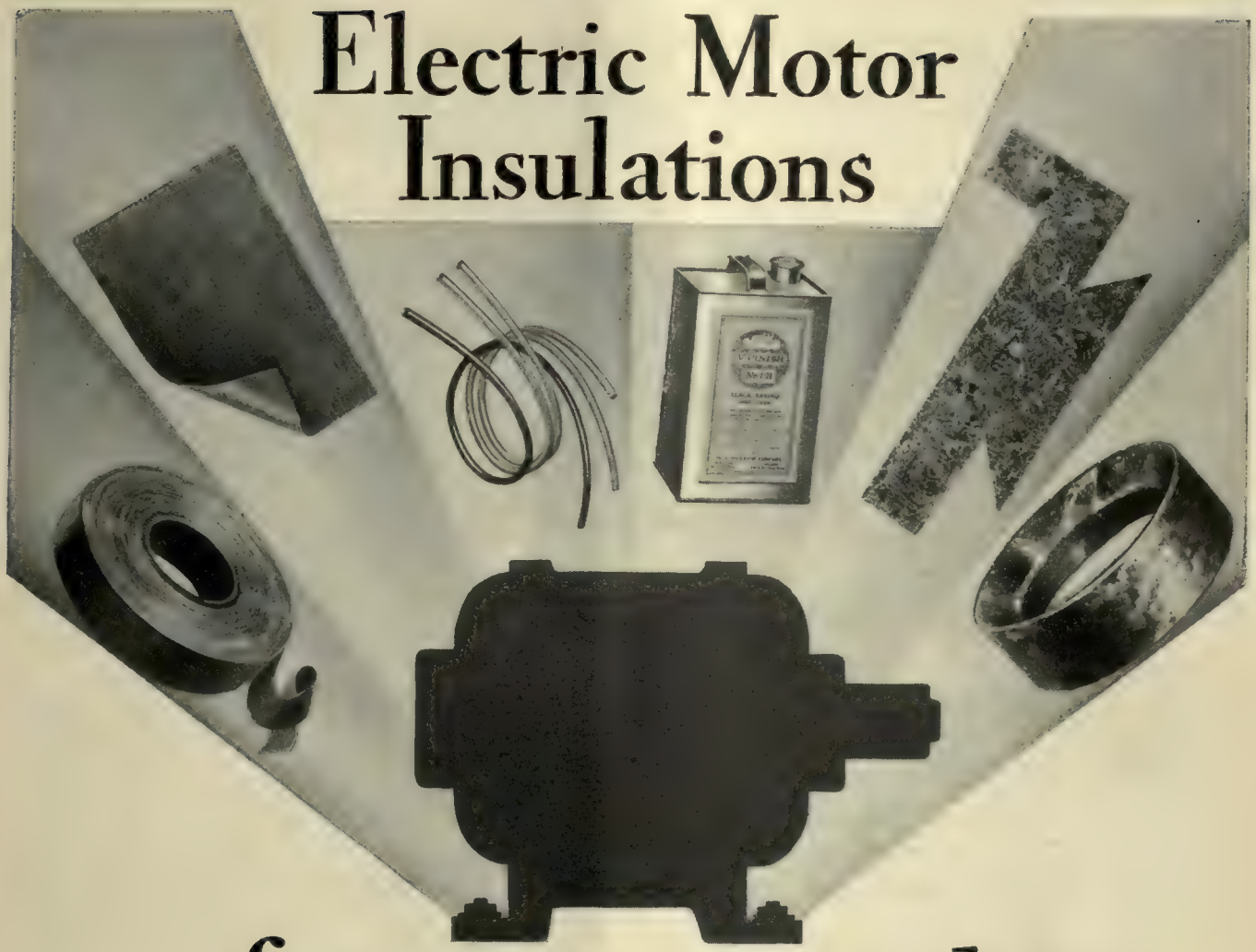
TEXACO

REG. U.S. PAT. OFF.

TEXACO LUBRICANTS

THE TEXAS COMPANY,
17 Battery Place, New York City

Electric Motor Insulations



...for every need

for every motor type and size!

Glance at the insulations listed at the right. There is one for every motor need from slot buttons to phase leads.

They are all performance-proved in thousands of motors of every manufacture. Their quality is unvarying, for throughout manufacture—from raw materials to finished products—continuous inspections to most rigid standards are maintained.

We offer you one source of supply for all your motor insulations and quality that is unexcelled.

MICA INSULATOR COMPANY

New York: 200 Varick Street Chicago: 542 South Dearborn Street

Works: Schenectady, N. Y. London, England

Cleveland Pittsburgh Cincinnati Birmingham Seattle San Francisco Los Angeles Toronto Montreal

Super-Micanite and Micanite

Commutator Segments Commutator, Rings, Tape.

Empire Oiled Insulations

Linotape, Cloth, Armatite, Paper, Tubing, Canvas Duck, Silk.

Mica Insulations

Varnishes, Compounds, Slot Paper, Cotton, Sleeving, Friction Tape, Rubber Tape, Twines.

PERFECT MICANITE INSULATOR

REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR

REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

PATENTS EXPIRING!

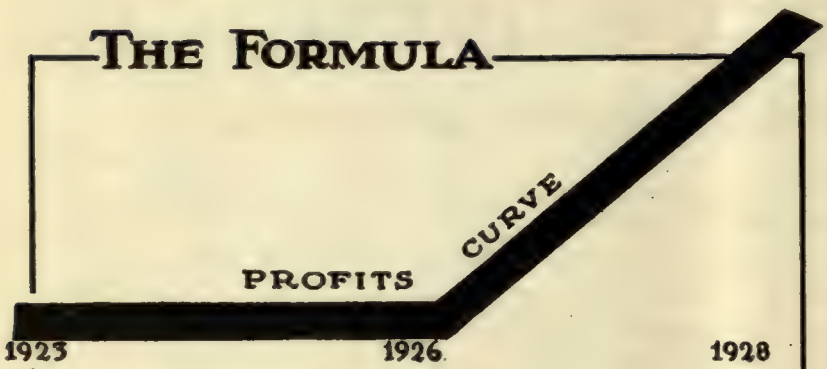
what'll we do?
what'll <u>others</u> do?

BASIC patents on a machine used extensively by a specific industry were owned by the ABC Corp.

The XYZ Co. also made the machine, along with other products, paying the ABC people a royalty for every machine sold. The XYZ Co. chose to stay in business without making a practical profit on this particular product. *Why?*

Two years or so ago the patents expired. The expected happened. Dozens of manufacturers turned to making the machine. But instead of diminishing sales for the XYZ Co., there came increased sales, pyramiding profits and leadership in the field. This leadership is being maintained today by the same formula that was used steadily for three years before industry-at-large was free to make the machine.

THE FORMULA



During this three-year period, when XYZ's profits were barely enough to pay the patent owners, XYZ advertised regularly in McGraw-Hill Publications—building recognition for the future—intrenching themselves in a strategic position for the *post-patent period*.

Pyramided effects of continous industrial advertising sent sales and profits constantly upward after patents expired. A sustained advertising program of full and double pages, with pithy, factful copy, is keeping the XYZ Co. in top place. A clear-cut victory—not so much for McGraw-Hill publications but for Industrial Advertising strategically applied.

McGRAW-HILL PUBLICATIONS

New York · Chicago · Cleveland · Detroit · Philadelphia · St. Louis
Greenville · San Francisco · Boston · London

W-18

Boyerize—and "skip-stop" the repair shops!



In continuous operation—that's where you will find cars equipped with Boyerized Parts. These parts have wear, tear and strain resisting qualities that are phenomenal. Boyerizing—a special process gives them this tremendous strength.

Boyerized Parts outlast parts made of untreated steel three to four times —reduce replacements 50 to 75%.

Put a "skip-stop" sign on your repair shops by specifying Boyerized Parts on new cars or for replacements. Use the list!

LIST OF PRODUCTS

- Brake Pins
- Brake Hangers
- Brake Levers
- Pedestal Gibs
- Brake Fulcrums
- Center Bearings
- Side Bearings
- Spring Post Bushings
- Brake Bushings
- Bronze Bearings
- Bolster and Transom Chafing Plates
- Spring Posts
- McArthur Turnbuckles
- Manganese Brake Heads
- Manganese Truck Parts

BOYERIZED PARTS

BEMIS CAR TRUCK COMPANY

ELECTRIC RAILWAY SUPPLIES

SPRINGFIELD, MASS.

Representatives:

F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 62-66 First St., Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Building, Los Angeles, Cal.



Bates-Truss Poles for Trolley Suspension

MODERN transportation demands modern methods. The Bates-Truss Pole is the solution of trolley suspension problems. The general tendency of electric railways toward the increased use of Bates-Truss Poles is significant in these days of high costs and keen transportation competition.

Structural simplicity, combined with lasting strength and fine appearance, makes the Bates-Truss Pole ideal for all forms of overhead construction. Let us quote you on poles, structures or towers.

BEST Bates Expanded Steel Truss Co.

EAST CHICAGO, IND.

ROLLER-SMITH

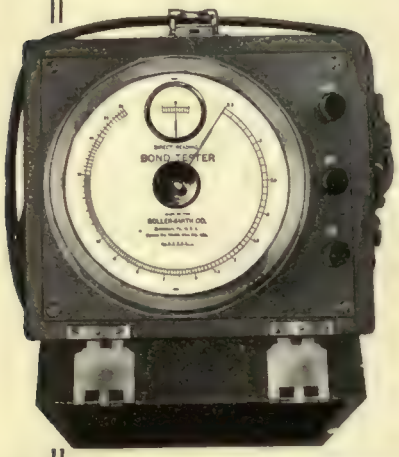
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RAIL BOND TESTERS

are

Standard the World Over





And for good reasons. They are light, compact and portable. Only one man is required to make quick, accurate readings. Readings in units of feet of rail are taken directly from the 300° long scale.

The Type SBT is recommended for all ordinary work and the super-sensitive Type BBT for conditions where there is little or no current in the rail. Bulletin G-200 should be in the hands of every man who is interested in bond testing. Send for it.

"Over thirty-five years' instrument experience is back of Roller-Smith"

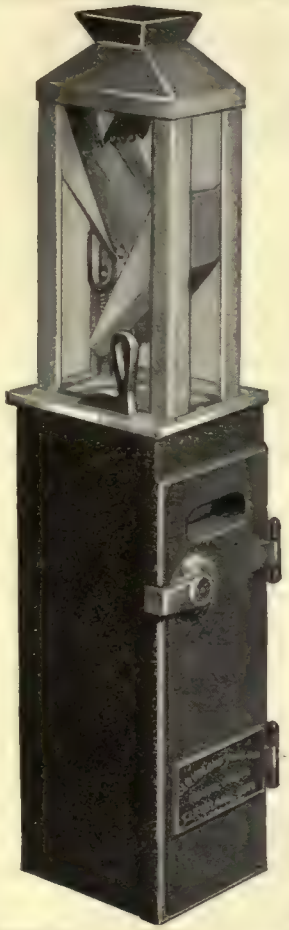
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Meets Any Change *in Fare or System*

The ease with which Clevelands fit into any fare collection system has made them standard on hundreds of properties.

Any system of collection can be built around them. They collect tokens and tickets as efficiently as coins.

Under your existing system, they insure efficient, modern fare collection. Their flexibility makes them fit into any change in fare collection that you may make tomorrow.

"4-Way" locks with other safeguards insure ample protection. Simple to operate and sturdily built they will easily outlast the car.

The Cleveland Fare Box Co.

4900 Lexington Ave. Cleveland, Ohio

Canadian Cleveland Fare Box Co., Limited, Preston, Ontario

"4-Way" Padlocks, Coin Auditing Machines, Change Carriers, Tokens

. . a sign . . .

Track areas paved with vitrified brick are unmistakable signs of

THRIFTY

FARSIGHTED

MANAGEMENT

For engineering data on Brick Pavements, write National Paving Brick Manufacturers Ass'n, 1245 National Press Building, Washington, D. C.

VITRIFIED

BRICK

PAVEMENTS

FACE THE FUTURE .. PAVE WITH BRICK

It's Poor Publicity --

An accident on your property may be news but it's poor—and costly—publicity for your lines.

NACHOD Automatic Signal equipment is the best insurance against such occurrences. Positive in action, there is a type for every need.

N-A-C-H-O-D

Spells Safety—On Your Crossings



On Streets—Over Your Entire System



The Nachod Turn-Right Signal (illustrated) prevents side swipes with autos. Nachod manufactures Signals for Single and Double Track. Stub End Signals, Annunciator Signals, Headway Recorders—a complete line for complete protection.

Nachod and United States Signal Co., Inc.

Louisville, Ky.

TUCOLITH

FLEXOLITH

REASONS WHY

1. Long Life
2. Attractive Appearance
3. Non-slip Surface
4. Fireproof
5. Sound Deadence
6. Sanitary



THE fine record of service of Tucolith flooring is proven by its years of use in over 50,000 vehicles. Its future is indicated by the increasing number of new street cars in which Tucolith is the specified flooring.

TUCO PRODUCTS CORPORATION

30 CHURCH ST., NEW YORK

RAILWAY EXCH. BLDG., CHICAGO

"Canned Experience" —*for Electric Railway Men*

The Most Efficient Methods Are Those Tested and Perfected by Men Recognized as Experts

The world's best research in the Electric Railway Industry is contained in these McGraw-Hill books. They have been written by noted engineers and authorities. From them you will gain a priceless heritage of "canned experience" which will give you a better grasp of your task and fit you for added achievement.

Richey— 1

Electric Railway Handbook

Second Edition, 798 pages, flexible, pocket size. 528 illustrations, $4.00.

A thoroughly revised reference book of practical data, formulas and tables for the use of operators, engineers and students. It gives the essential reference data on all phases of electric railway construction and operation. It presents: (1) Data on subjects which come up in everyday railway practice. (2). Material of service to the non-technical manager or operator. (3) Reference material on electric railway practice for those who are specializing in other or allied lines.

Healy— 2

Electrification of Steam Railroads

Published May, 1928.

By KENT T. HEALY, Assistant professor of Transportation, Yale University; formerly Inspector and Cost Engineer, The New York, New Haven and Hartford Railroad.

395 pages, 6x9, 165 illustrations, $5.00.

This book combines the description of the physical characteristics of the elements of electrification with the analysis of economic problems and the operating performance of both electrification and electric operation. Special emphasis is given to such topics as power supply contracts, overhead distribution systems and economic data.

Harding— 3

Electric Railway Engineering

Third Edition, 480 pages, 6x9, 248 illustrations, $5.00.

A thorough revision of this standard work on the theory and practice of electric railway engineering. The book covers the principles of train operation, power generation, and distribution, equipment and types of systems.

Blake and Jackson— 4

Electric Railway Transportation

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A second edition of this widely known book on the transportation side of the electric railway business—getting the cars over the tracks—increasing the traffic—collecting the fares—and selling service in the face of modern conditions. Particular consideration is given to the place of the bus in modern transportation.

King— 5

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369 pages, 6x9, 349 illustrations, $4.00.

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These books may be examined for 10 days FREE

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.....2. Healy — Electrification of Steam Railroads. $5.00.
.....3. Harding—Electric Railway Engineering. $5.00.
.....4. Blake and Jackson—Electric Railway Transportation. $5.00.
.....5. King — Railway Signaling. $4.00.

I agree to return such books as I do not wish to keep, postpaid, or to remit for them within 10 days of receipt.

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City and State
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Name of Company E. 1-30

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Erico CAE Arc Weld Bonds are preformed. That's one reason why they are so widely used for special work and cross bonding. It's the reason, too, why the cable goes over splice bars without twisting or bending to get the bond to lie in position on the rail.

Type CAE Arc Weld Bonds are made with copper terminals. Due to the angle at which the terminal is sheared, every wire is exposed to the welding arc and must be included in the weld. The large area of weld is secured with but one half electrode per terminal, using C-1 flux coated copper electrodes which are short and convenient for the welder to handle.



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A request for samples entails no obligation.

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The Electric Railway Improvement Co.

2070 E. 61st Place, Cleveland, Ohio

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PANTASOTE

TRADE MARK

—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

TRADE MARK

—the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

Standard for electric railway cars and motor buses



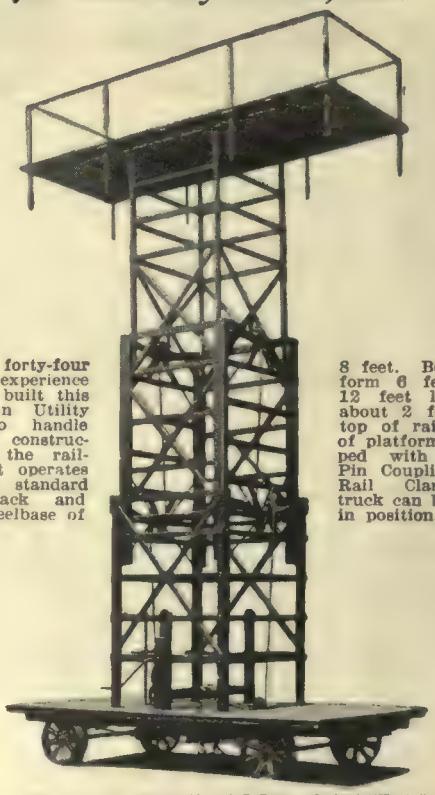


Samples and full information gladly furnished.

The PANTASOTE COMPANY, Inc.

250 Park Avenue NEW YORK

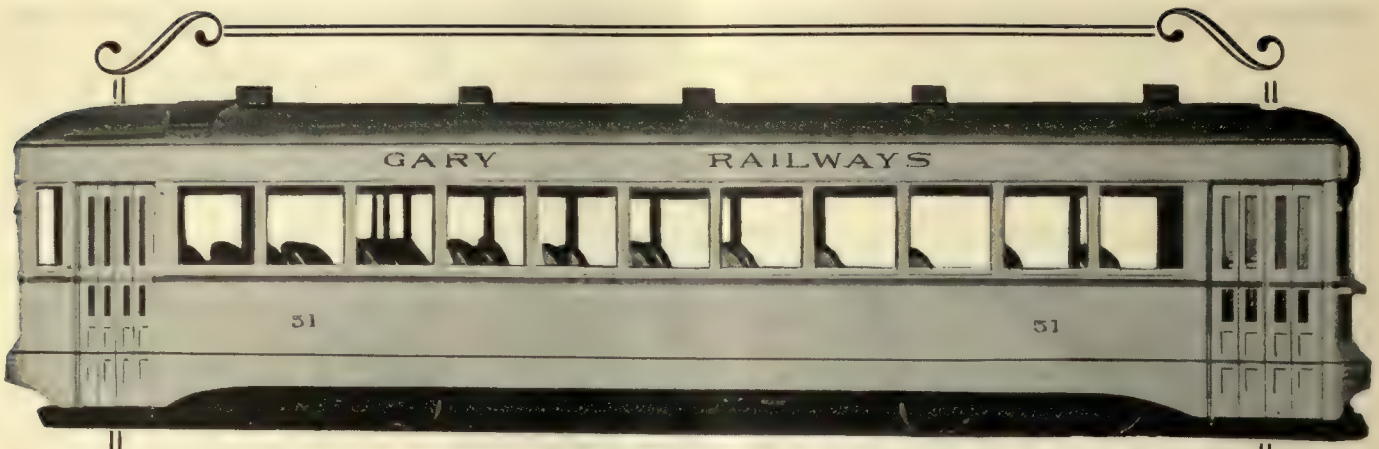
THERE'S A TRENTON TOWER *for Railway Work, too!*



From our forty-four years' experience we have built this Trenton Utility Tower to handle overhead construction on the railroads. It operates on ARA standard gauge track and has a wheelbase of 8 feet. Body platform 6 feet wide, 12 feet long and about 2 feet from top of rail to top of platform. Equipped with Brakes, Pin Couplings, and Rail Clamps so truck can be locked in position.

J. R. McCARDELL AND COMPANY

391-401 SO. WARREN ST., TRENTON, N. J.



One of the Latest Type Lightweight-One-Man Interurban Cars built by CUMMINGS CAR AND COACH CO.

111 West Monroe St., Chicago, Ill.



JOHNSON FARE COLLECTING SYSTEMS

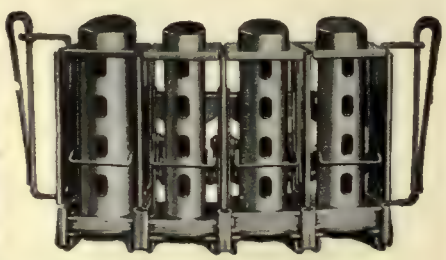


Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Quicker boarding of passengers with resultant reduction in running time for the buses. Over 5,000 already in use.

When more than three coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates. It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tokens.





Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.



Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company

Muncie, Ind.

Est. 1848—Inc. 1870



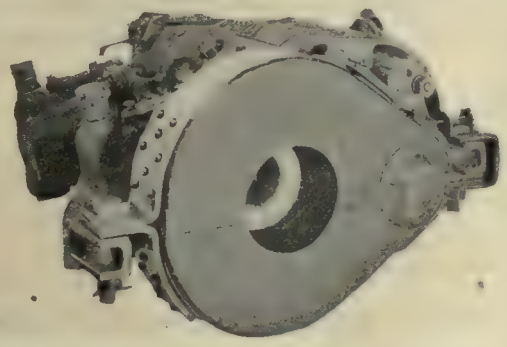
Replacements in 1930

Silver Lake Trolley and Bell Cord lead again for special railway service. Durable and economical, produced from the best yarns obtainable, the quality of Silver Lake products has made them standard for the industry.

For replacements in 1930 order Silver Lake. Samples on request.

SILVER LAKE COMPANY
Newtonville. Mass.

Chillingworth
One-Piece Gear Cases



Seamless, Rivetless, Light in Weight

Chillingworth One-Piece Gear Cases will wear longer because they are made of tough durable deep drawing steel, properly annealed and supported by strong Malleable Iron Brackets, or Forged Steel if you prefer.

Because of the seamless one-piece construction with overlapping joints, they prevent dirt entering or grease escaping—the best possible means of saving your gears and pinions.

Chillingworth One-Piece Gear Cases meet all operating requirements. Used extensively on rapid transit service. Most steam road electrifications use Chillingworth Cases.

Chillingworth Manufacturing Co.
Jersey City, N. J.

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ENGLAND
Tool Steel Gearing & Equip. Co.

FRANCE
A. P. Champion

CHOSEN for PERFORMANCE

TROLLEY wheels are never chosen for looks, never selected because one kind costs a little more or less than another. They're chosen for performance. That's why

KALAMAZOO



trolley wheels and harps are the standard of comparison today. That's why many properties use them exclusively. There's a difference in trolley wheels. May we tell you about it?

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MILEAGE GUARANTEED

Are you interested in reducing your operating costs?

Start the year by making a check of your wheel and maintenance cost. Allow our experienced wheel engineers to make a survey of your operating conditions and recommend a design of the new chilled back of flange and chilled rim wheels best suited for your particular service.

We can show you a definite saving per 1000 car miles and a material reduction in shop costs and equipment charges.

No turning—No maintenance

Address any of the following

GRIFFIN WHEEL COMPANY PLANTS

CHICAGO
DETROIT
CLEVELAND
CINCINNATI
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COUNCIL BLUFFS
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The 2000 Type

N-L

Bus Heater

Increased heating efficiency, simplified assembly, absolute insulation from body, easy installation and low cost are the features of the new 2000 type Heater. Supplement B-4 mailed on request, contains a complete description.

The Nichols-Lintern Co.
7960 Lorain Ave., Cleveland, Ohio



R 11 Double Register

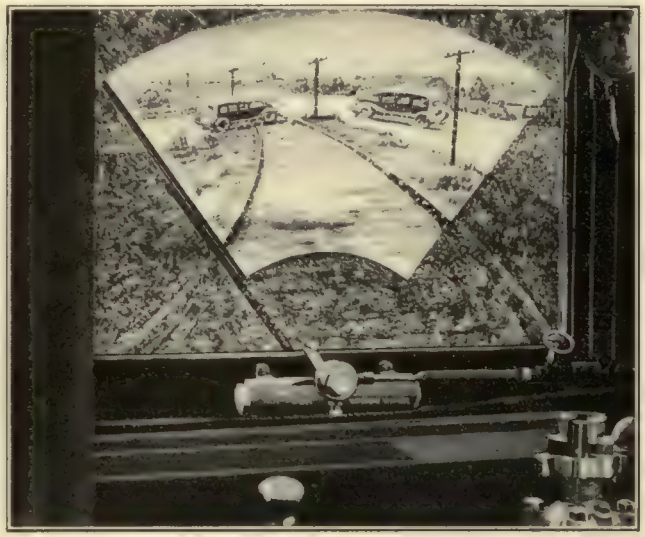
A Fare Registration System that Gains the Confidence of ALL

The durability, accuracy, speed and convenience of International Registers has given them the nation-wide reputation for efficient service that they have enjoyed for over thirty years.

Electric operation gives the new types even greater speed, accuracy and convenience. Registers can be furnished for operation by hand.

The International Register Co.
15 South Throop St., Chicago

It's Dependable—



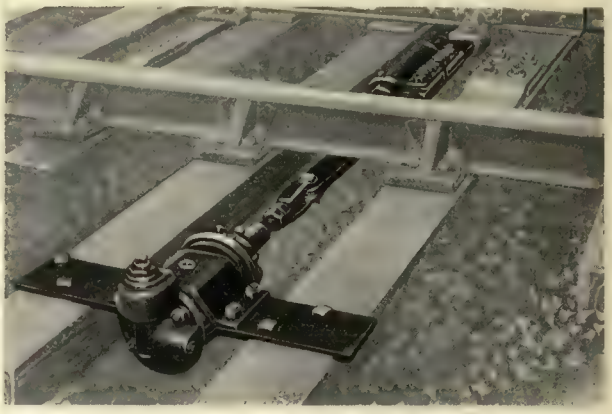
Open the Eyes of Your Operators with——

The AIR-PUSH WINDOW WIPER

Built to Wear the Lifetime of Your Equipment

National Railway Appliance Co.
Graybar Bldg.
420 Lexington Ave.
New York

WORKS LIKE A DOOR CHECK



Unprotected Spring Return Switches get severely battered by every passing wheel flange running against them. The RACOR Oil Cylinder Retarding Dash Pot gives protection.

Acting exactly like a door check, it allows the points to be forced aside easily by the first flange but retards their return movement. The result is that successive flanges do not strike but only rub the points and the life of the points is greatly prolonged.

This equipment is simple, has few parts, requires little attention and will operate in any climate. It is double acting. Operates automatically with switch in either position and freely for hand throw.

Behind Racor Service stand nine plants which specialize in the manufacture and distribution of railroad track turnout and crossing equipment, including Manganese work for heavy traffic.

RACOR

RAMAPO AJAX CORPORATION

General Offices — 230 PARK AVENUE, NEW YORK

RACOR PACIFIC FROG & SWITCH CO. Los Angeles — Seattle

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McCORMICK BUILDING, CHICAGO
METROPOLITAN BANK BLDG, WASHINGTON
BUILDERS EXCHANGE BLDG, ST. PAUL

CANADIAN RAMAPO IRON WORKS, LTD. Niagara Falls, Ontario

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SEARCHLIGHT SECTION

EMPLOYMENT and BUSINESS OPPORTUNITIES—USED and SURPLUS NEW EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, excepting Equipment, 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch $6.00
2 to 3 inches..... 5.75 an inch
4 to 7 inches..... 5.50 an inch

Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

B.J.

POSITIONS VACANT

ACTIVE, ambitious young man wanted for position of street and interurban railway superintendent. Man of technical training and experience in operating responsibility desired. Must furnish references and complete statement of experience. An excellent executive opportunity with rapidly growing street and interurban railway system in the Middle West. P-192, Electric Railway Journal, 520 No. Michigan Ave., Chicago, Ill.

New "SEARCHLIGHT" Advertisements

must be received by 3 P.M., the 15th of the month to appear in the issue out the 1st of the month.

Address copy to the Searchlight Department

Electric Railway Journal

Tenth Ave. at 36th St., New York City

STREET RAILWAYS

We are in the market at all times to purchase and dismantle abandoned street railways. Highest prices paid.

M. K. FRANK
Park Row Bldg., New York

POSITIONS WANTED

ARMATURE winder well experienced with railway equipment desires change. Reference. PW-197, Electric Railway, Tenth Ave. at 36th Street, New York.

SOMEWHERE there is an electric line which handles less than carload freight and express, who are not satisfied that they are getting the volume that they deserve. Such a condition might be the result of a combination of things. A successful operator of more than twenty years in business getting, systemizing, station operations, claims and claim prevention is prepared to go into such a position and bring the revenue up to expectations and cement a genuine friendship on the part of the customer for the carrier. I can do that job. PW-196, Electric Railway Journal, Tenth Ave. at 36th St., New York.

BUSINESS OPPORTUNITY

Capital Raising

Stock and bond selling campaigns planned and executed for companies seeking development. Mergers, reorganizations and now financing by experienced dependable financial organization. Reference exchanged and booklet by request. The Brookworth Co., Inc., 110 East 42nd St., New York, N. Y.

IMMEDIATE SHIPMENT

FOUR BIRNEY CARS

in good condition. Any reasonable offer accepted.

FS-195, Electric Railway Journal
Tenth Ave. at 36th St., New York City

Agents and Representatives—

can be secured through the

SEARCHLIGHT SECTION

Responsible Agents and Representatives consult the Searchlight Section for new lines to handle.

THE PERRY, BUXTON, DOANE CO.

New and Relaying Rails

All Weights and Sections

We specialize in buying and dismantling entire Railroads, Street Railways, and all other industrial properties which have ceased operation. We furnish expert appraisals of all such properties.

May We Serve You?

THE PERRY, BUXTON, DOANE CO.

Rail Department, Philadelphia, Pa. General Department, Boston, Mass.

Pacific Sales Office—Failing Building, Portland, Oregon

Sell out to Salzberg—Railways Purchased in Entirety

FOR SALE

6—Light Weight Double Truck Passenger Cars
two to four years old—excellent condition—ready for immediate shipment.

Single Truck Sweepers.
Double Truck Snow Plows.
Railway Motors.
Controllers.
Compressors.

Reasonably priced.

Let us have your requirements.

When business judgment dictates the wisdom of abandoning part or all of your electric railway equipment—don't let it rust away in idleness waiting for the chance piece-meal buyer to gradually unburden you, at big losses.

Do the one practical thing. Sell it as a unit to SALZBERG—complete with power plant, track, feeder and trolley wire system and rolling stock.

You will get FAIR dealing and the highest prices that are based solely on present day market values. Save money, time and trouble. We will do our own dismantling.

No obligation for our proposition.

H. E. SALZBERG COMPANY, INC.

225 Broadway — Estd. 1898 — New York City, N. Y.



Competent to solve cleaning problems

ASK us about your car and motor repair cleaning problems that seem to defy solution. From our long experience in serving electric railway systems, we can suggest suitable Oakite materials and methods for overcoming the difficulty.

Our nearest Service Man will gladly study your cleaning requirements and recommend the most effective and economical Oakite material for saving time and effort in cleaning cars, large and small truck and brake parts, motor parts, etc. A postal to us will bring him to your shop.

Manufactured only by
OAKITE PRODUCTS INC., 28B Thames St., NEW YORK, N.Y.

Oakite Service Men, cleaning specialists, are located at

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*Stocks of Oakite materials are carried in these cities.

OAKITE
TRADE MARK REG U.S. PAT OFF.
Industrial Cleaning Materials and Methods

ALPHABETICAL INDEX

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The 1930 Budget

for Tubular Pole Maintenance and Construction - - -



This part of the 1930 appropriations for maintenance and construction may not be satisfactorily large.

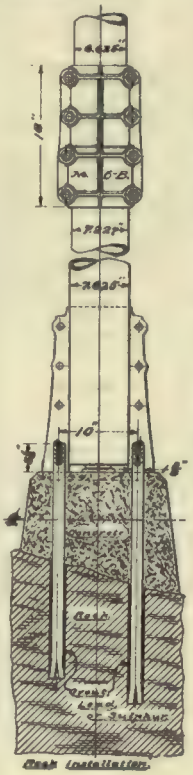
Expand it by taking advantage of the salvage and construction hints given in our new bulletin—Accessories for Tubular Iron Poles.

Reinforcing and Extension Clamps

A-Clamps—for reinforcing corroded joints, or extending poles, with 1 in. reduction in outside diameter from lower to upper section. *Installation illustrated at right.*

B-Clamps—for reinforcing corroded swaged joints where reduction in outside diameter is less, averaging about 5/8 in. from lower to upper section. *Illustrated below.*

C-Clamps—for same diameter of pipe throughout. Larger sizes for overcoming ground-line corrosion, or for lower extensions, and smaller sizes for pole-top extensions.



Williams Pole Mounts

Pole Mounts, *as illustrated at left*, frequently provide the only satisfactory, economical method of salvaging old tubular poles, or installing new poles under certain conditions—such as anchoring poles on bridges, rock, concrete, etc. Also used with pre-cast concrete base to salvage pole corroded at ground-line, or to give maximum clearance with given pole.

M. I. F. Crossarm Gains

Assemblies are available for all service conditions, weights of feeders, lengths of arms, bracing, etc. Lighter in weight, yet amply strong.

Other M. I. F. Specialties

used by Electric Railway Companies and covered in other Bulletins are:

Williams Pole Mounts for wood poles. Crossarm Gains for wood poles. Cable Insulator (Span) Hangers—Spool Insulator or split spool types, with conductors parallel to messenger or at right angles, for single conductor, or in multiple, etc.

Send for new Bulletin mentioned, also literature on other items.

MALLEABLE IRON FITTINGS COMPANY
Pole Hardware Department
Factory and New England Sales Office: Branford, Connecticut
Middle Atlantic States Sales Office: 30 Church St., New York, N. Y.
General Sales Agents elsewhere in U. S.
LINE MATERIAL COMPANY, South Milwaukee, Wis.
Canadian Mfg. Distributor: Line & Cable Accessories, Ltd., Toronto

More fares

DURING RUSH HOUR OPERATION





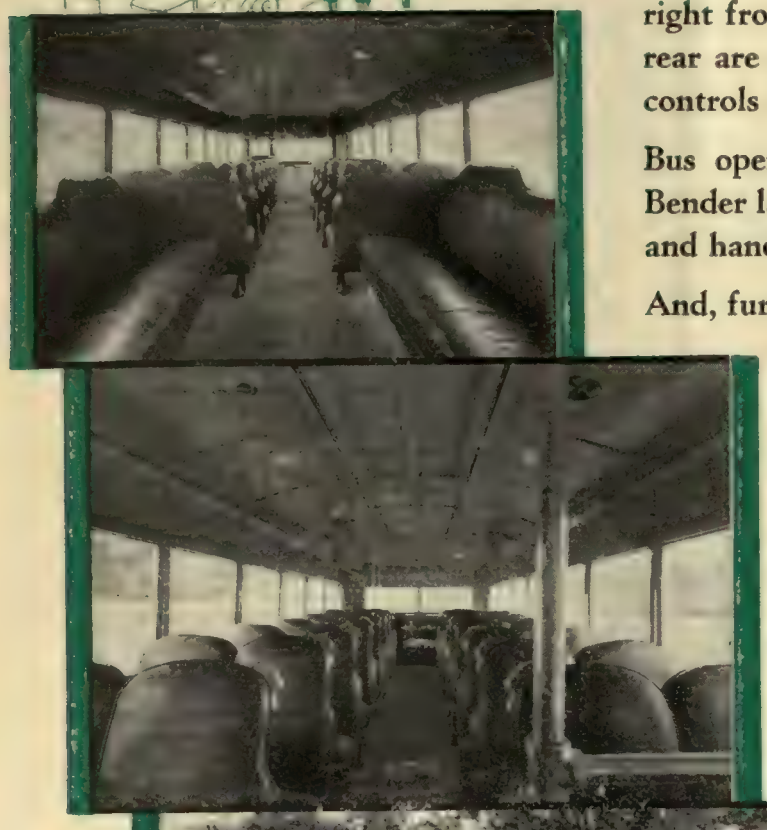
NOT only 38 comfortable seats but also a big 23-inch aisle and generous standing well, providing accommodations for many additional passengers.

The four-piece jackknife entrance door at right front and the same type exit door at right rear are actuated by pneumatic air engines with controls at driver's seat.

Bus operators know from experience that this Bender large City Pay-Enter handles bigger loads and handles them with more speed and ease.

And, furthermore, like other Bender units, it has that inbuilt quality of durability combining stamina with a practical lightness of weight, assuring low maintenance and longer life.

You will profit by getting the complete facts from us.





THE BENDER BODY CO.
W. 62nd and Denison, Cleveland, O.



Wilmington Reorders Again!

In 1928 the Delaware Electric Power Company of Wilmington, Delaware, purchased ten Brill low-level city cars. During the summer of 1929, ten additional cars were delivered and now an order for twelve more of this same type car has been received.

Here is ample evidence of the value of modernization with Brill Cars equipped with Brill Trucks.

Let this same combination work for you in your city.

THE J. G. BRILL COMPANY, Philadelphia

Associate Plants

American Car Company, St. Louis, Missouri
The G. C. Kuhlman Car Company, Cleveland, Ohio
Wason Manufacturing Company, Springfield, Mass.
Pacific Coast Representative, Rialto Bldg., San Francisco

BRILL

A NEW STAR TO HITCH TO . . .



...for quieter, more comfortable riding, reduced operating costs, and bigger profits.

The TIMKEN-DETROIT AXLE CO.
DETROIT, MICHIGAN



TIMKEN *Worm Drive* TRUCKS

FOR · ELECTRIC · RAILWAY · CARS

ELECTRIC RAILWAY JOURNAL

raw-Hill Publishing Company, Inc. FEBRUARY, 1930 Thirty-five Cents per Copy



Champion —in more than name



COMPARATIVE operating tests have proved the superior calibre of Westinghouse "Champion" trolley ears.

These tests show their higher conductivity, uniform thickness of lips, longer life, and greater tensile strength. The "Champion" consists of two parts—the body and the runner. The body is made of a special high strength alloy; the runner, from a flat, tough copper sheet, blanked, punched and shaped.

We suggest that you give the "Champion" a test. Write our nearest district office for some of these ears. You will be convinced of their outstanding qualities.

Let the "Champion" be your next trolley ear

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

T 31007

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

MORRIS BUCK
Engineering Editor
GEORGE J. MACMURRAY
CLIFFORD A. FAUST
J. W. MCCLOY

JOHN A. MILLER, JR., *Managing Editor*

Vol. 74, No. 2 *Pages 65-124*

PAUL WOOTON
Washington
ALEX MCCALLUM
London, England

LOUIS F. STOLL
Publishing Director

Next Month

How one electric railway is solving the small city transportation problem

De luxe buses in interurban service — another phase of the subject discussed in this issue

New developments in track construction

McGraw-Hill Publishing Company, Inc.

Tenth Avenue at 36th Street
New York, N. Y.

CABLE ADDRESS:
"MACHINIST, N. Y."

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1930

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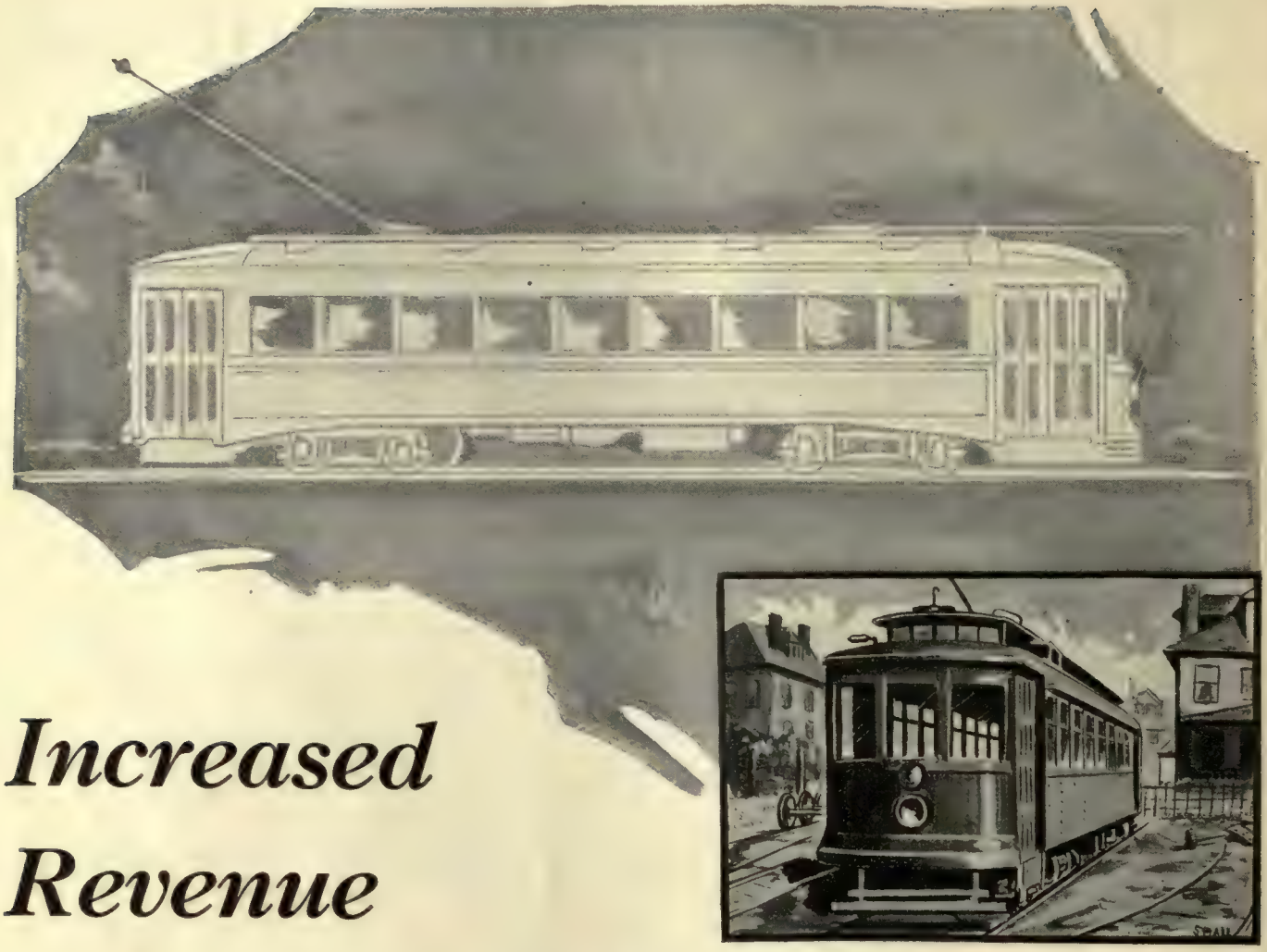
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Increased Revenue

Results from higher schedule speeds

HIGHER schedule speeds may be obtained not only by the use of new and modern cars, but also by properly rehabilitating old equipment, making use of modern development. For instance:—

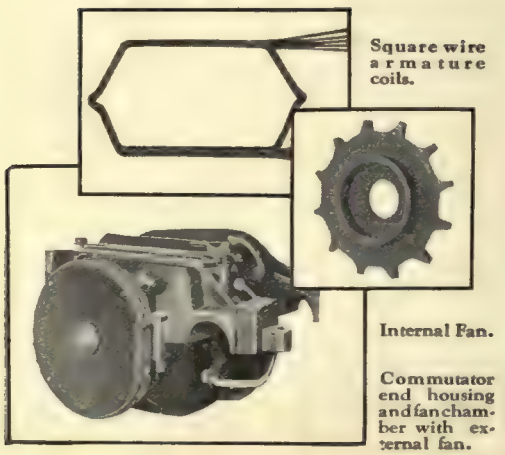
Some ways to increase speed are:

1. Change the gear ratio.
2. Shunt the field.
3. Use fields with fewer turns.

And then, too, increased ratings may be obtained by the use of:

1. Internal and external fans.
2. Square wire armature coils.
3. Class "B" insulation.

Any Westinghouse transportation salesman will be glad to assist you himself or to send an engineer to help you make a study of your requirements in order to help you obtain *higher schedule speeds.*



WESTINGHOUSE ELECTRIC & MFG. COMPANY
EAST PITTSBURGH PENNSYLVANIA
SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES OF THE UNITED STATES

Westinghouse

T 30710

SPEEDY car movement

--attracts new freight business



BALDWIN-WESTINGHOUSE electric locomotives are necessary tools in giving the reliable and speedy car movement that attracts new freight business.

The Wisconsin Power and Light Company recently ordered a 50-ton, 600-volt, 400-hp., Baldwin-Westinghouse locomotive. Prompt shipment permitted its being placed in freight and switching service almost at once over the 15-mile run between Sheboygan and Plymouth connecting with trunk line railroads.

Seventy-five of these standard 50-ton Baldwin-Westinghouse electric locomotives are in successful service throughout the United States.

A recent survey of freight haulage business on typical electric railway properties indicates a 50 per cent increase in gross freight receipts between the years 1920 and 1928. The excellent performance of Baldwin-Westinghouse locomotives was a contributing factor to these favorable business records.

Address either company or call our nearest office for full particulars about standard Baldwin-Westinghouse electric locomotives.

Have you seriously considered the freight possibilities of your property?

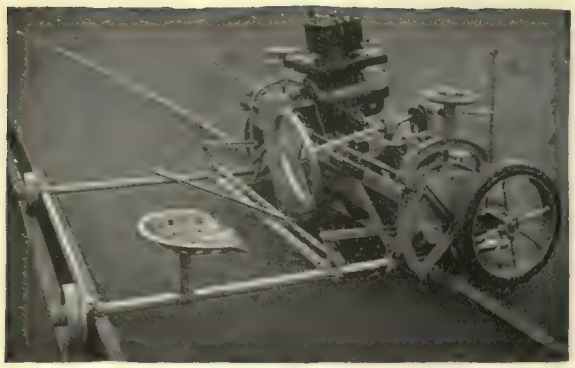
The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

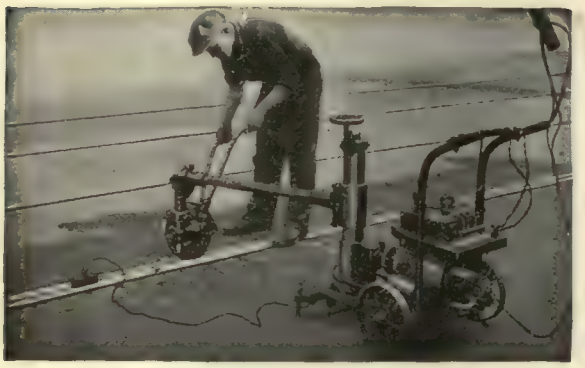
MEMBER AERA 1930

Baldwin-Westinghouse

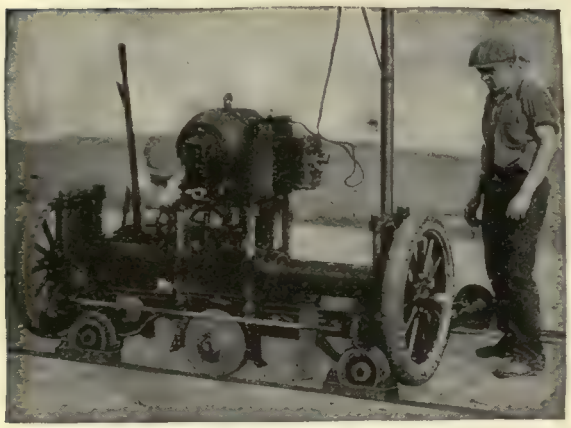
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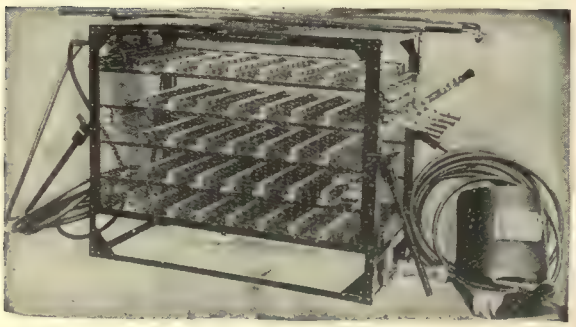
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

Is road to rule— or rail?

Billions for better roads. How much for better rail?

Every dollar for better roads helps automobile compete with rail.

Every dollar for better track helps rail compete with automobile.

Nobody wants to ride rough road or rough rail.

Smooth your rail and keep it smooth with the equipment you see here.

Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia

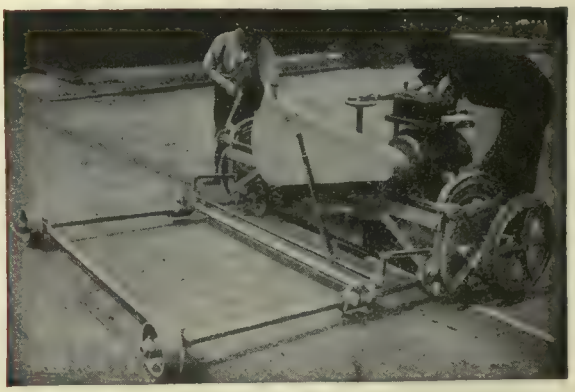
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Chas. N. Wood Co., Boston
H. F. McDermott, 208 S. LaSalle St., Chicago
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H. E. Burns Co., Pittsburgh, Pa.
Equipment & Engineering Co., London

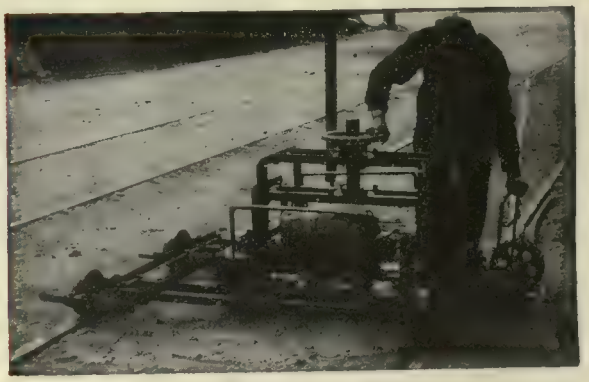
4060



Reciprocating Track Grinder



Vulcan Rail Grinder



Midget Rail Grinder



RTW Curve Oiler

Cut Your Pole Replacement Budget $73.52 for Each Worn Out Pole



1

View showing pole to be renewed, with ground dug away to determine corrosion.

Renewing Steel Poles at Ground Line With O-B Pole Sleeves Gives Old Poles Double the Life of New Poles, at a Total Cost of $12.98 Each

HOW many of your steel poles were replaced last year? How many of them were corroded only at the ground line? Multiply this last number by $73.52, and the result is the actual saving you would have realized had you *renewed* these poles with O-B Pole Sleeves.

This fact has been proved by the experience of electric railway properties in practically every large city in America, where O-B Pole Sleeves are saving thousands of dollars annually.

This is how it works out. A new 30-ft. pole (7-inch) costs about $61.50. Freight, haulage, unloading and installation labor costs are at least $25.00. So, every new 7-inch pole costs approximately $86.50 to install.

But, by *renewing* the old pole with an O-B Pole Sleeve, the cost is only about one-seventh that of a new pole installed, and the added life is double that of a new pole. Here is the cost—

1	7-in. Pole Sleeve . . .	$10.50
Labor:	2 men @ .60 per hour .	1.20
	Foreman @ .80 per hour	.80
	Cement, sand, gravel and paint .	.48
	Total *Renewing* Cost	$12.98

Your saving on each pole renewed is $73.52

Unless you are now using O-B Pole Sleeves, you are "passing up" one of the most outstanding money-saving opportunities in system maintenance today. Furnished in five sizes, for 5-in. to 10-in. poles.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1186L

Ohio Brass Co.
NEW YORK PITTSBURGH PHILADELPHIA BOSTON CHICAGO CLEVELAND SAN FRANCISCO ST. LOUIS LOS ANGELES ATLANTA DALLAS
PORCELAIN INSULATORS · LINE MATERIALS · RAIL BONDS · CAR EQUIPMENT · MINING MATERIALS · VALVES

2

Slipping the O-B Pole Sleeve into position on the pole. Note ease of installation.



3

The O-B Pole Sleeve in position ready for sealing with Portland Cement.



4

Pouring the cement. The entire space between pole and sleeve is filled.



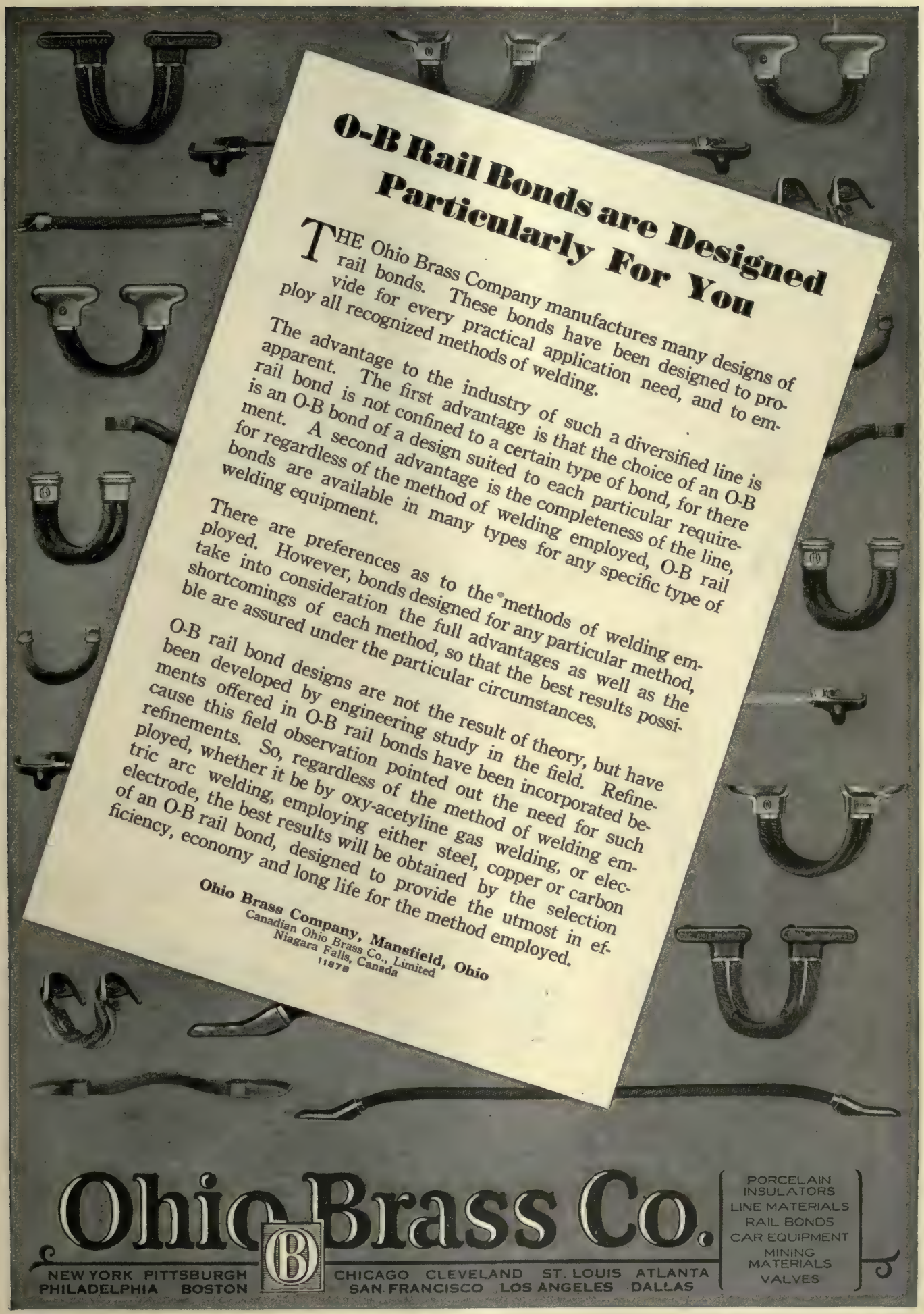
5

Shaping the cement cap over top of O B Pole Sleeve to shed water and moisture.



6

Cementing the base. Sidewalk poles are cemented flush with pavement.



O-B Rail Bonds are Designed Particularly For You

THE Ohio Brass Company manufactures many designs of rail bonds. These bonds have been designed to provide for every practical application need, and to employ all recognized methods of welding.

The advantage to the industry of such a diversified line is apparent. The first advantage is that the choice of an O-B rail bond is not confined to a certain type of bond, for there is an O-B bond of a design suited to each particular requirement. A second advantage is the completeness of the line, for regardless of the method of welding employed, O-B rail bonds are available in many types for any specific type of welding equipment.

There are preferences as to the methods of welding employed. However, bonds designed for any particular method, take into consideration the full advantages as well as the shortcomings of each method, so that the best results possible are assured under the particular circumstances.

O-B rail bond designs are not the result of theory, but have been developed by engineering study in the field. Refinements offered in O-B rail bonds have been incorporated because this field observation pointed out the need for such refinements. So, regardless of the method of welding employed, whether it be by oxy-acetyline gas welding, or electric arc welding, employing either steel, copper or carbon electrode, the best results will be obtained by the selection of an O-B rail bond, designed to provide the utmost in efficiency, economy and long life for the method employed.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
11878

Ohio Brass Co.

NEW YORK PITTSBURGH PHILADELPHIA BOSTON CHICAGO CLEVELAND ST. LOUIS ATLANTA SAN FRANCISCO LOS ANGELES DALLAS

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES



Installation of Type T-twenty-in-series lighting fixtures in a new model Brill Car.



Reducing car lighting to a *science*



Safety Dome Lighting Fixtures provide numerous advantages over older methods of car illumination, requiring less current consumption, more perfect diffusion of light and the elimination of eye strain. And by using larger lamp units they have the advantages of longer lamp life, simplified wiring and less theft.

Aside from this, they provide much more attractive interiors by the inviting and artistic effect they produce.

Above is illustrated two views of the type T fixtures and also a typical installation. These units are used in the new twenty-in-series lighting system, which also utilizes the cutout type C lamp.

Many types of dome type lighting fixtures are illustrated in our No. 7 catalog and in special data sheets which will be sent to you upon request.







Write for Special Data Sheets

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

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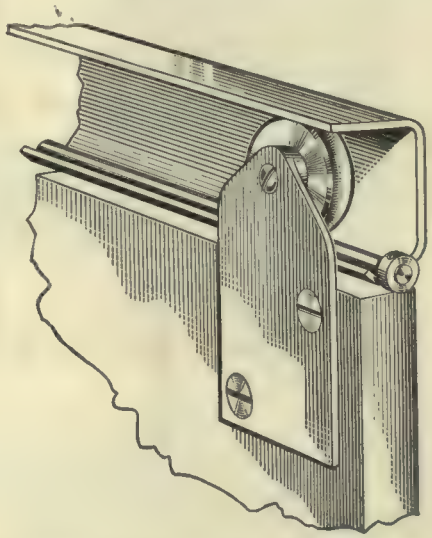
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An *Indestructible* Track for sliding doors

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And the wearing surface can be easily replaced.



Applicable to either new or old cars.

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We shall be glad to supply facts and figures regarding this interesting subject.

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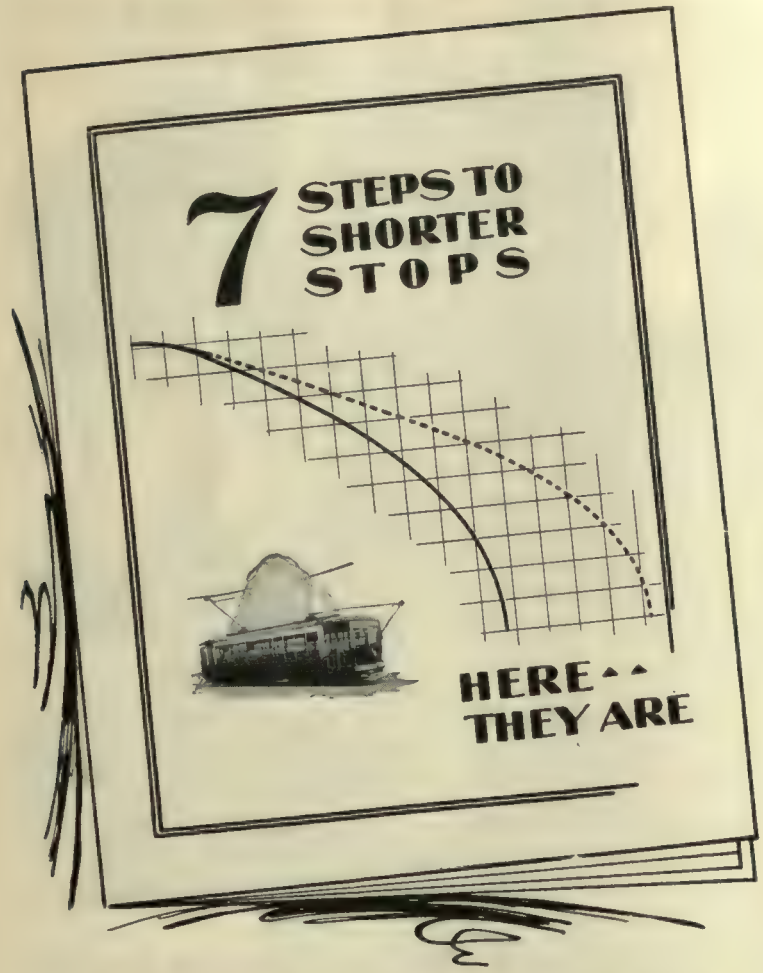
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This Hale & Kilburn No. 392-A deep cushioned leather covered reversible seat is the one used by the Market Street Railway in San Francisco.



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YOU have, no doubt, been following our series of advertisements dealing with the seven factors that influence stopping distance. . . . The interest manifested in this series by street railway men throughout the country has indicated an eagerness for better brake performance. . . . These advertisements have now been reprinted in booklet form for ready reference and connected study by those interested. If you have not already received a copy, write for one now. Ask for Publication 9073.

Remember, also, that our engineers are always available for assistance in solving your braking problems.

WESTINGHOUSE TRACTION BRAKE CO.

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G-E Glyptal Lacquers *modernize* industrial painting. Let them modernize *yours*—beginning NOW!

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GENERAL ELECTRIC

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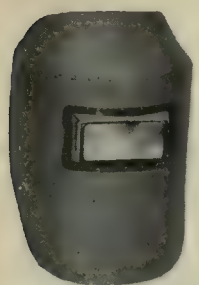
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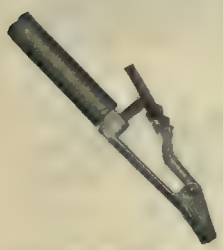
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General Electric offers accessories that *aid* welders. They are the result of practical experiments. They are adapted to inside or outside use.

Receive the most from your welders' efforts by furnishing them with quality accessories.

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The Gary Railways Company improved local service with this type of modern light-weight car, G-E equipped



For interurban operation, also, Gary Railways Company uses modern cars with G-E equipment

GARY WELCOMES NEW CARS

BUSINESS men and city officials joined the throng that welcomed new street cars into service between Gary and Crown Point, Ind. Like scores of other cities, Gary is helping people to realize more and more that the railway industry is keeping up with the times—that modern equipment offers speedy, comfortable transportation.

The Gary Railways Company operates a total of 72 street cars, of which 14 are used in interurban service. All are equipped with G-E motors, G-E control, and G-E air brakes. General Electric Company, Schenectady, New York. Sales offices in principal cities.

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15 Trolley Buses *for* Salt Lake City G-E *Equipped*

THE trolley bus is fast becoming an important part of the transportation system in Salt Lake City. Such advantages as maneuverability, smooth, quick acceleration, speed on grades, low operating cost, and decreased paving charges have led to a recent decision of the Utah Light and Traction Company to provide fifteen additional units.

The new Salt Lake City trolley buses will be equipped with General Electric motors and foot-operated PCM control,* with electric braking feature.

*PCM control, a recent General Electric contribution to the railway industry, provides automatically smoother and faster acceleration. For complete information, communicate with the nearest G-E sales office.



A motion-picture film showing trolley buses in operation is available. Address the G-E office nearest you

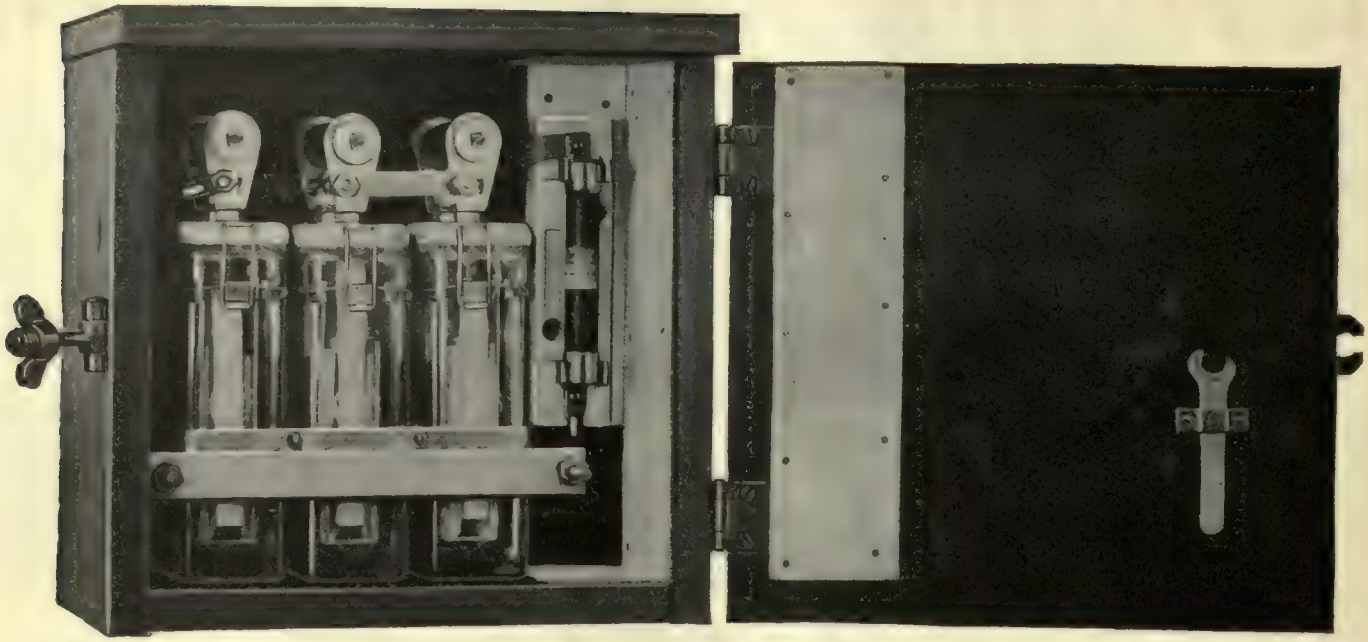
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THE NEW G-E ALUMINUM ARRESTER



3 Times Approved at Baltimore

IN each of three successive years —1927 to 1929—the United Railways and Electric Company of Baltimore, Md., has purchased 250 G-E aluminum lightning arresters. This company operates 1131 passenger cars and 149 service cars.

The unqualified approval of the G-E aluminum arrester at Baltimore dates back to 1910, when 1000 units were purchased. These were in continuous service until 1926, when a much improved type was announced by General Electric. Since then, the improved design and better performance of the new arrester have resulted in the gradual replacement of the original units.

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SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 74 New York, February, 1930 *Number 2*

Supreme Court Strikes Off Shackles of Inadequate Rates

GOOD reason for expecting improvement in the financial condition of the electric railway industry is found in the recent decision of the United States Supreme Court in the rate case of the United Railways & Electric Company of Baltimore. The court definitely established two important principles of rate making and reaffirmed a third which it had previously laid down. It held that the electric railway company was entitled to a return of 7½ to 8 per cent on its present fair value. It ruled that depreciation should be set up on the basis of "expenditures equal to the cost of the worn-out equipment at the time of replacement; and this, for all practical purposes, means present value." Moreover, the decision suggests, although it does not definitely state, that present reproduction cost must be considered the most important factor in determining valuation for rate-making purposes.

Encouraging, indeed, is the ruling that a return of 7½ to 8 per cent is not excessive. Since the industry in general has had to pay interest at this rate or more when it has gone into the market for new money, it cannot fairly be denied permission to earn that rate of return. Few state regulatory bodies, however, have been willing to grant rates sufficient to accomplish this purpose. It is noteworthy that only two members of the Court, Justices Brandeis and Holmes, took exception to this part of the decision and that their objections were directed rather at the rate base than at the rate itself.

Concerning the proper basis upon which to calculate depreciation, wide differences of opinion have long existed. On the one hand it is said that the purpose of setting up depreciation is to permit the replacement of worn-out physical property. The natural corollary of this is that replacement cost should be the basis of calculation. On the other hand it is claimed that the object should be merely to restore to the treasury the money originally spent; from which it follows that original cost rather than replacement cost should be the basis of calculation. When the latter plan is adopted the extra cost of the new property required to replace that which has been worn out must be met by borrowing additional money and thereby increasing the capital investment.

Provided that the earnings are high enough to permit borrowing, it does not make a great deal of practical difference which method is followed. In one instance the company must earn a larger sum for depreciation, while in the other, the depreciation allowance is smaller, but there is also required a certain sum for interest on the additional investment. The relation between these amounts depends on the difference between the original and the replacement cost and the length of the useful life of the property. Since the general level of prices is upward rather than downward, the original cost method of calculating depreciation will result in a steadily increasing invesment and a steadily increasing burden of interest charges.

To what extent the opinion of the court may be taken as an indorsement of the reproduction cost theory of valuation is not entirely clear. This point was not at issue and the decision merely asserts that "it is the settled rule of this court that the rate base is present value." Judging from the previous rulings of the court in the Indianapolis Water Company case and the St. Louis & O'Fallon Railroad case it may be inferred that reproduction cost is to be considered a major element in determining value. This view is strengthened by the vigorous dissent of Justices Brandeis and Holmes, who are recognized believers in the prudent investment theory of valuation. The language of the decision, however, leaves this phase of the matter open to argument.

Prompt improvement of the financial condition of the railway in Baltimore may be expected to result from the decision. Ultimately it is likely to have far-reaching effects in fare cases now pending in other cities. At this time when the need for modernization of the electric railway equipment has received wide recognition, the decision of the court is particularly timely and opens the door to a new and better era for the local transportation industry.

Improved Fire Record Brings Lower Insurance Rate

FOR many years the fire record of the electric railways was not one in which the industry could take much pride. More recently, however, a marked improvement has occurred. Several factors have contributed to this improvement. Present-day structures and equipment are not so inflammable as those of an earlier period. Greater care is devoted to storage of materials. A larger measure of attention is paid to periodic inspections. More efficient methods of fire detection have been developed, as well as automatic equipment for fire extinguishing. All this has resulted in a material decrease in the number of fires in electric railway carhouses and shops, and a decrease in the seriousness of the fires that have occurred.

This achievement has been the more noteworthy when compared with the steadily rising fire losses for the country as a whole. In recognition of this, new fire insurance rate schedules for electric railways have been granted in 42 states, and tentatively adopted in three others. For this accomplishment a large measure of credit goes to the committee on insurance of the American Electric Railway Association. It is now up to the

railways themselves to take advantage of the opportunities that have been offered to them. If they do, substantial savings will be effected. There is every reason to expect that improvement in the fire record will be continued, in which event it may be anticipated that still further reductions will be made in the rate schedule.

Luxury Becomes a Necessity

DE LUXE buses in urban service have proved their ability to earn profits. That they have done so independently and not at the sacrifice of revenue from city-type operations is a fact of major significance. The attractive equipment and the fast, direct service which is typical of the majority of these lines has appealed to a new kind of rider. This is clearly shown by a survey of numerous properties published elsewhere in this issue. Almost without exception, the de luxe lines now in operation, charging fares considerably above those for street car service, are routed so as to connect the downtown business, shopping and theater districts of the city with one or more exclusive residential sections. The business man has found this service convenient for his trips to and from the office and as comfortable as traveling in his own private automobile. During the mid-day hours the women enjoy an attractive vehicle for their shopping trips.

Some of these lines have opened new territory that would not support or permit street cars, but the majority of them are furnishing a selective additional service through communities already well served by city lines. The higher fares, 25 cents in the majority of instances, make it possible for the operating company to render faster and more luxurious service, yet at the same time offer economies to the motorist who has been in the habit of using his automobile for commuting. It has been estimated that a person cannot drive his car into town, park it and return home at a cost less than $1 per day. At half the cost he can use the buses and not have the worry of driving or parking. Traffic conditions, parking restrictions and the cost of short-time storage in a garage are all working for the benefit of the de luxe bus and are more than indirectly responsible for the expansion of this class of service.

Further evidence of the future of the de luxe bus is found in the statistics of recent bus purchases. There were more buses of this type bought by the electric railways last year than in any previous year. Approximately 400 more de luxe buses were purchased in 1929 than in 1928, while there was an increase of only 23 in city-type buses. Undoubtedly there is a definite luxury trend in bus operations, and the electric railways are strengthening their systems both from an operating and economic standpoint by expanding their service along this line.

Value of Elevated Railways Proved Anew

ALTHOUGH occasional clamor is heard in favor of the removal of elevated railways from city streets, evidence continues to accumulate that they still have a real place in providing transportation in large communities. An apt illustration of this is furnished by comparison of the service now being given by the elevated railway lines in New York City and the service which a new elevated motor highway now under construction along the Hudson River waterfront is expected to render. The cost of this undertaking probably will exceed $18,000,000, and its carrying capacity has been estimated at approximately 100,000 persons per day. A few blocks away an elevated railway is at present carrying more than 250,000 persons per day. A subway could do no more. Yet the city, while spending vast sums for the construction of the new elevated highway, is proposing at the same time to tear down its elevated railways.

An argument often advanced is that the present elevated railway structures are unsightly. In this respect the elevated highway promises little improvement. Already a forest of ugly steel columns has sprung up in the center of West Street interfering to a considerable extent with surface traffic. Of course, there is much to be said in favor of the new project. By providing a by-pass route without grade crossings between lower Manhattan and the uptown residential districts it will undoubtedly afford some relief to the city's congested streets. But the real measure of usefulness of a transportation facility is the number of people accommodated. From this standpoint the elevated railways are far more valuable than the new highway.

In Manhattan, unfortunately, the elevated railways stand low in public esteem. Stations of corrugated iron designed and built in an era when jigsaw work was the ultimate in ornamentation cannot fail to shock the esthetic tastes of the present-day Gothamite. Nor can rolling stock of the pre-Spanish war period hold forth much in the way of rider appeal. But stations can be made artistic, and modern cars, less noisy and more comfortable than those now in use on the "L" in Manhattan, are obtainable.

That the prejudice against elevated structures in New York is being carried to an extreme is evidenced by the fact that this very useful and relatively inexpensive form of transit is being to a large extent ignored in plans for the future. Into the far reaches of Brooklyn and Queens, amid scenes almost pastoral, subway routes are being planned at enormous expense to handle anticipated development that is at best many years away. Chicago, more wisely, provides in her new city plan for some 70 miles of elevated lines to serve the more remote suburbs. Before deciding that the day of the elevated railway has passed, New York would do well to study carefully the facts and figures of the situation.

Scientific Accident Analysis Brings Practical Results

SAFETY has as its ultimate goal the prevention of all accidents. In industry, however, it has been necessary to interpret it in relative terms because the ideal seems impossible of attainment. Since it is inevitable that some accidents should occur, their cost must be estimated year by year and allowed for in the budget as a more or less constant element of operating expense.

As a result of this treatment of the situation from the financial point of view, accident prevention work frequently degenerates into a part of the regular routine, and efforts to better conditions become perfunctory. Preaching accident prevention by emphasizing to the men the cost to the company is not effective, particularly if the operator believes he is doing the best he can. Trying to place the blame for the accident on someone other than the operator is not profitable, for it does not

reduce the pain of the victim or the grief of his friends, nor does it save the expense involved. But that sometimes represents the scope of accident prevention work. In refreshing contrast to this is the attitude of the winners of the latest Anthony N. Brady Memorial Safety Award, as evidenced by the briefs submitted in the competition and abstracted in this issue.

The program of research in accident prevention outlined by the Boston Elevated Railway, which won the Brady medal in the class of large properties, is particularly noteworthy. Not satisfied with the ordinary methods, the management had a searching analysis made to determine, so far as possible, all the causes of accidents in order that they might be dealt with intelligently and eliminated wherever possible. A program was put before the organization in such a manner that all co-operated in working it out effectively. After only one year the results have been remarkable. They have proved the soundness of the methods used. The good operators have remained good and the poor ones have become much better. There has been a marked reduction in the number and in the severity of accidents.

While the methods which are so successful in Boston may appear elaborate for some of the smaller properties, there is nothing that cannot be used with suitable modification. In fact, the smaller size of a property should make the use of similar methods simpler and should produce results more quickly. The other winners of the Brady awards did use methods which, while not developed so scientifically as those used in Boston, followed along similar lines in many respects. Intensive and continuous efforts made it possible to improve the already good records they had achieved in past years.

Putting Noise on the Defensive

NOISE is receiving ever-increasing attention as an unfavorable factor in American life, particularly in metropolitan centers. Means of eliminating or reducing it are under consideration nearly everywhere. Unnecessary blowing of factory whistles has been banned. Even the ringing of church bells is looked upon with disfavor in some cities. The noisy motor truck, a consistent offender, has occasioned so much caustic comment that in many places it has become the subject of police regulation. Drilling and blasting for building foundations are today subjects of criticism. Riveting, that symbol of progress, is under suspicion, for now electricity welds building frames in silence. Contractors have become apologetic about the noise they feel compelled to make.

With all this campaign against unnecessary noise it is inevitable that unfavorable attention should be directed to noisy street cars. Many people probably believe that the noise of street car operation cannot be eliminated. Few indeed realize the progress that is being made along this line. The committee on noise reduction of the A.E.R.E.A. has shown conclusively that most of the noise usually associated with car operation is unnecessary. New cars are being built that are far less noisy than those of the older types. Even the old cars can be made far less noisy than some of them now are. A monkey wrench and a screwdriver will work wonders in tightening up the loose bolts and screws. Loose or broken parts that rattle and squeak can be attached securely or replaced. Noisy air compressors, the curse of many cars, can be repaired or new ones installed that do not make a racket every time the car stops.

As to the track, of itself it is one of the quietest things on earth. But when a car passes it begins to act up and emit many and various noises. Here again the wrench and the welder can make a lot of difference. By tightening loose joints, truing up worn surfaces and securing correct alignment even poor track can be so improved that cars can run on it without emitting sounds of pain that arouse the neighborhood.

Since noise is an indication of inefficiency, it follows that the noisy car is being subjected to strains that are heading it for the repair shop sooner than necessary. Money spent on noise reduction will return directly in lower maintenance costs. Equally important, however, is the effect on the public. This cannot be measured in dollars and cents but it is hardly an exaggeration to say that it may mean the difference between success and failure.

Use of One-Man Car Upheld

FINDINGS of the special master in the suit in equity of the Shreveport Railways vs. City of Shreveport to enjoin enforcement of an ordinance requiring two men on every street car are not only of importance to the company in question, but also carry a message affecting the entire industry. In no uncertain language it is pointed out that a municipality's right under its police powers to interfere in matters of this kind exists only when necessary to the safety and convenience of the public. The court states that from the evidence the modern one-man car with safety devices has been shown to be safer than its predecessor, the two-man car. Furthermore, the evidence shows that speed has been increased and that companies have been able to operate more service, that wages have been increased, and that operators have become more efficient and better satisfied when the change from two-man to one-man cars has been made. Moreover, the court found that since 1917 no public service commission has refused to permit the operation of one-man cars, and since 1924 no commission has limited the right to use one-man cars subject to any particular conditions. Under these circumstances the refusal of the city to permit the use of one-man cars of the latest type was held to be arbitrary, and equivalent to a taking of the railway's property without due process of law.

Aside from the specific matter of safety of one-man operation, the court made several significant statements. The evidence showed that a choice had to be made between reducing railway operating expenses through the instrumentality of the one-man car, and the ultimate bankruptcy of the company and the loss of electric railway service to the city of Shreveport. The court was unwilling that the city should lose its railway. It appraised the situation correctly when it said that street cars, for the present at least, appear to be an essential means of transportation for a large portion of the population, particularly those not able to own automobiles, and the loss of such service without an equally cheap substitute would be a serious handicap to a growing community.

While the fight against the one-man car has largely died out, this decision makes the position of the courts more definite than it ever has been. In addition, it challenges the right of the municipal authorities to exert their police power in matters which do not affect the safety and convenience of the public.

NOTABLE ACHIEVEMENTS IN

Accident Prevention

Win Brady Awards for Boston, Tampa and Tide Water Companies

Marked improvement shown in 1928 safety records as compared with previous years. Honorable mention made of Louisville Railway and El Paso Electric Company

WINNERS of the Brady safety medals have recently been announced by the American Electric Railway Association. There are three divisions in the contest, according to the amount of service rendered. In Class A, including electric railway organizations operating more than 5,000,000 vehicle miles, the award, consisting of a gold medal, was made to the Boston Elevated Railway, with honorable mention to the Louisville Railway. The Class B award, a silver medal, for those companies operating more than 1,000,000 but not over 5,000,000 vehicle miles, went to the Tampa Electric Company, with honorable mention to the El Paso Electric Company. In Class C, for smaller properties, the bronze medal was awarded to the Tide Water Power Company of Wilmington, N. C.

The awards are a memorial to the late Anthony N. Brady, and are presented each year for the best records of safety in operation and health promotion made by electric railways. The selection of the winners was made by a joint committee of the American Museum of Safety and the American Electric Railway Association, consisting of Lewis Gawtry, president the Bank for Savings, chairman; Col. A. B. Barber, manager transportation and communication department U. S. Chamber of Commerce; James H. McGraw, chairman of the board McGraw-Hill Publishing Company, Inc., and Charles Gordon, managing director American Electric Railway Association.

Accident Analysis Successful in Boston

BY FAR the most impressive accomplishment of the Boston Elevated Railway in its safety work has been its study of the human factor in accidents. Since it was recognized that accidents may be caused by some human failings, primarily of a psychological nature, the railway engaged the Personnel Research Federation of New York to survey the situation. As a result it was found that half of the accidents happen to less than a third of the operators. In one sample of 200 men of ample experience and maturity, one-half the accidents happened to only one-fifth of the motormen. This difference in proneness to accidents holds even when the question of blame is eliminated. A further study indicated that men who pay the most attention to operating efficiently, as evidenced by the percentage of coasting obtained, are also the men who have the least accidents. It was found that the 100 men with the lowest coasting records had 364 accidents and 73 delinquencies, while the 100 men with the high coasting record had 313 accidents and 46 delinquencies. A further study of delinquencies of bus operators developed that, apart from fare irregularities, among the low-accident men there was an average of 9.7 delinquencies which were made by 65 per cent of the men; whereas among the high-accident men, there were 16.8 average delinquencies made by 89 per cent of the men.

A study of the men over 50 years of age showed that 21 men with abnormal blood pressure had a total of 136 accidents, or 6½ per man; those with normal blood pressure, numbering 38, had 110 total accidents, or an average of 3 per man. The length of service was found to have a very distinct relation to the number of accidents, the older men having far less accidents than the younger ones; second, the largest number of accidents and the largest proportion of men having a large number of accidents are in the group with less than one year of experience.

Summing up, it was found that there are four classes of men who may be regarded as more than ordinarily prone to accidents: (1) those who do not operate economically, as shown by low coasting record; (2) those whose record of delinquencies is long; (3) older men with abnormal blood pressure, and (4) younger men with very limited experience.

Following this survey the records of car operators and motormen were studied individually. They were divided into two classes: (1) high-accident men, i.e., those with five or more collisions during 1927; (2) low-accident men, i.e., those with fewer than five collisions during 1927. It was found that out of 2,300 operators, approximately 20 per cent, or 472, were high-



In Boston, traffic lanes are marked prominently at congested intersections

accident men, and the remaining 1,828 were low. The 1,828 low men were regarded for the time being as satisfactory operators, and were left under the usual influences inducing safety.

The high-accident men were then studied and handled individually. Two things were noted about these men: (1) the man who tends to have many slight accidents, which are themselves relatively unimportant, is also the man who tends eventually to have serious accidents; (2) the man who has many accidents in one year is also the man who is likely to have accidents every year. Accident proneness may, therefore, be regarded as something in the nature of a disease, which has to be diagnosed and treated. The first step in treating a man is finding out why he has accidents.

Instructors were then brought into conference, relative to the 472 operators who were on the high-accident list. They rode on the cars with these operators, making



Many safety measures are in use in the Boston shops. This view shows the advantage of depressed pits with leg holes for inspection and repair work on trucks and motors

observations as to their habits. Then the habits of the operator, his record, personality, and physical condition were all considered together in an attempt to arrive at conclusions regarding the cause of his accidents, and in relation to the possibility of the effectiveness of individual action, the main thought being that the man should be cured of his accident tendencies if possible.

The method chiefly depended on to produce a reduction in accidents was instruction on the job by the especially trained instructors. While instruction was mainly relied on, two other methods were used: (1) where the accident record of a man indicated that he did not realize his responsibility, he was interviewed by the



Some 291,000 cars or trains passed over this electric switch in 1928 without a derailment

safety supervisor and division superintendent; (2) where the cause of accident was ill health, the men were physically examined and told what was the matter with them, and advised to go to their own physicians for treatment.

Since the habits in question were generally of long standing and a change would require some time, it was necessary to arrange follow-up work. Each inspector was required to see each of his operators on the job, the frequency depending on the seriousness of the case. When it became apparent that although a man might do his job well during the hours the instructor was with him, he might not do it at all well during the other 47 hours of the week, the entire street supervisory force was enlisted. Their hours and duties were rearranged so that they could include a great measure of personal supervision of high-accident operators.

A selected group of instructors and supervisors was consolidated into a group of safety inspectors, working directly under the safety supervisor. Districts were allotted to these inspectors, according to the routes and districts where the accident hazards were greatest. Sample studies of accidents and times of accidents were made. It was then made the duty of the inspectors to acquaint the high-accident men with all the information they had regarding the accident hazards of the district.

Other activities of the transportation department con-



Sand is spread on slippery streets where buses of the Boston Elevated run, and it protects general vehicle traffic as well

cerning accidents have included conferences with the division superintendent regarding the method of handling men, co-operation of the dispatchers and carhouse starters, particularly with respect to warning operators when weather conditions were unfavorable, or when men were placed on new routes, and keeping a careful check of punctuality. These men have also been encouraged to inspect cars and see that the equipment is on hand and the car in perfect running order.

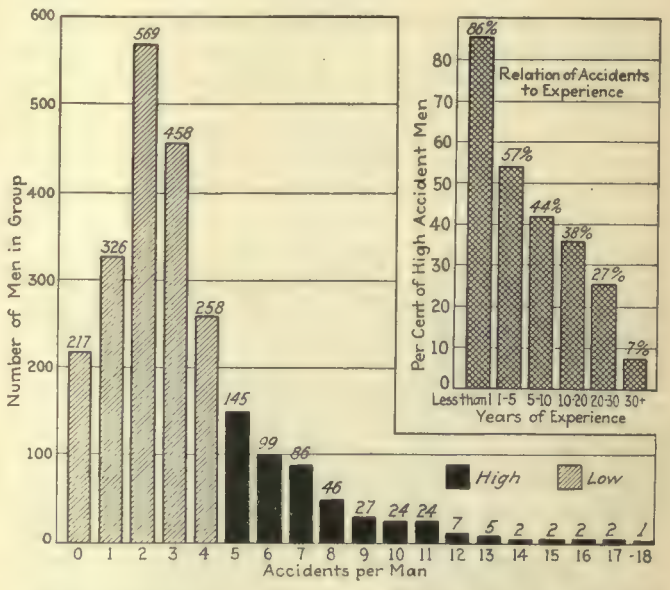
Results that have been obtained have proved the soundness of these methods. During the year 1928 the collision accidents involving surface cars were reduced from 7,197 to 5,923. This reduction came about by concentration of efforts of high-accident men. Figures show that the 472 high-accident men in 1927 averaged 7.1 accidents per man, or a total of 3,327 accidents. During 1928, 312 of these men averaged 2.1 accidents per man, or a total of 663; 160 averaged 7.1 accidents per man, or 1,136 total accidents. The accidents for this group were therefore 1,799 altogether. Contrasted with this the 1,828 low-accident men in 1927 averaged 2.1 accidents per man, a total of 3,870 accidents. During 1928, 1,693 of these men averaged two accidents per man, or 3,386 accidents; while the remaining 135 averaged 5.8 accidents per man, or 738 accidents, making a total of 4,124 accidents for this group. Thus it will be seen that while there was a 46 per cent reduction in the accidents of the men in the first group, a number of the men of the second group had a larger number of accidents in 1928 than 1927. The discovery, after the first year's investigation, that a few of the men placed in the low-accident group could not be classed as constantly low-accident men was an unforeseen but valuable result of the investigation. With the additional knowledge obtained, the system of training has been rounded out to include provisions for special treatment of this new group.

Accident location studies have been made on a different basis from that usually employed. For instance, on a particular route a check-up showed that the inbound collisions were all with the front left corner of the car, while outbound collisions were with the right front corner. The reasons for this were investigated, and the instructors and men were told how they should operate in view of the condition. This cut the accidents on the line to one-third of the former number. In another instance, instructors were overheard telling the men how much extra care was necessary at a certain corner, where studies showed that there had been no accidents for more than a year.

Investigation showed that the times of the accidents as well as the locations should be taken into account. In one place it was found that inspectors had been on duty sixteen hours a day during the previous winter to look after traffic conditions, but during the evening rush the inspector was required to go to a cross-over 1,000 ft. away. Study revealed that 80 per cent of the accidents at this point occurred during the evening rush hour. Placing a man there from four to six in the afternoon resulted in cleaning up the bad spot, and the sixteen hours of unnecessary supervision was eliminated. In another place, the prevailing type of accident in the summer required twenty-hour supervision, while a study of winter conditions showed that 75 per cent of the accidents occurred during only five hours of the day. The superintendent found that he could arrange for five hours supervision, and did so, reducing accidents on the route from nineteen to nine a month.

At the beginning of 1928, the inspection school and the employment office of the railway were consolidated as the division of employment and training. Inspectors teach the new employees as well as the older ones. Preparing for an interview with a man, the superintendent decides that it would be better to have this man's instruction followed up on the card. The regular instructor arrives with him and gives him instruction when necessary. Eighty high-accident men have been taken out on special cars in street operation by the division inspectors. These men have been re-instructed for from one to three days, and special attention has been given to any faults in operation or habits which increase accident hazards.

The work of 1928 showed that when every possible expedient had been tried to cure men of their accident proneness, some were not successfully handled. In order to discover the reasons for their accident proneness a psychology laboratory was set up and these men put



Accident proneness is confined to relatively few men. This record from Boston shows that 1,828 low-accident men had 3,870 collisions, or an average of 2.1 per man, while 472 high-accident men had 3,327 collisions, or 7 per man. The small chart shows distinctly that caution comes with experience, most of the high-accident men being young in the service

through tests to secure further information about their mental make-up. After observations it was found that several psychological factors are more or less constant as contributing causes of accidents: (1) the degree of adaptability of the operator to various types of equipment; (2) his quickness of reaction to sound and light; (3) powers of concentration over a period; (4) judgment of speed and distance.

From these tests it was determined that operators should be divided into three classes: (1) first-rate operators, 73.6 per cent of all, who never have more than a few accidents; (2) those who for one reason or another do not ordinarily operate in a safe manner, unless special methods of instruction are adopted, but who always would be classed as high, comprising 20.5 per cent of the total; (3) those who are likely to be either in the high-accident or low-accident class in any year, forming 6.6 per cent of the men. In this third class fall those who are qualified in all classes of service and who change from one type to another, and those whose health, family circumstances, etc., either improve or become worse in any year.

The function of the safety organization, then, has been three-fold: (1) to reduce the number of high-accident men; (2) to follow up the men whose manner of operation has improved and crystallize their improved habits; (3) to prevent unnecessary shifts of those men who, due to change of operation, will have a tendency to come into the high-accident class.

Safety an Integral Part of Management

Two fundamental principles determined the policy of the Boston Elevated Railway in its safety work during 1928, according to the company's presentation. First, safety is an integral part of management and not simply something to be taken care of by a special department charged with the administration of safety features only. Second, all specific safety efforts must be preceded by and based upon thorough research and investigation into past accidents and their causes.

In order to interest the public in accident prevention, there has been close co-operation with the Massachusetts Safety Council, officials of the railway being on the executive board of that organization. During 1928 the general manager of the railway was president of the council.

Particular attention has been taken to interest the children in safety. A special motorcycle officer detailed to make observations at the opening and closing of schools found that the children from certain streets did not have due respect for their own safety, so that he visited the schools in question, talked with the teachers, and in some cases talked directly with the children of the class. Another result was the formation of a junior safety council in the schools; the co-operation of local service clubs was secured; the Kiwanis Club donated white safety belts to the boys for use while on duty as safety patrols.

In connection with its physical plant, the company has done much to make the track safe for operation. In addition a derailment committee visits the scene of the trouble whenever a derailment or a split switch occurs. The evidence obtained is weighed and a decision is reached as to the probable cause. As a result, in comparison with 243 derailments in 1927, costing in claims $15,130, there were only 208 derailments in 1928, costing in claims $11,548.

In order to prevent collisions with cars turning, clearance lines have been painted on the pavement. On one of the recently opened highways, known as the Northern Artery, the hazards to passengers have been eliminated by moving the safety zones from the highway and placing center loading areas between the tracks. These center loading areas allow passengers to keep away from the vehicular traffic, which is not halted while passengers are boarding and alighting.

Particular attention has been paid to the equipment to keep it at all times in safe operating condition. The older buses which were purchased by the company in 1922 and in several years thereafter have been replaced by modern buses of steel construction which have much greater strength to withstand shocks in collisions. The street cars have also been maintained better, and there is an improved reliability of the cars from the accident standpoint. In cars, both for surface and rapid transit lines, safety features have been installed. Much new testing equipment has been installed in the shops to insure that the cars are in safe operating condition. Changes have been made in the rapid transit stations to enhance the safety of passengers. Safeguards have been placed at approaches to drawbridges to prevent cars from running off the track at such points.

Due to the extensive use of automobiles in winter, as well as during the open months, changes in the snow removal program have been made so that a width of at least 14 ft. in the roadway adjoining the tracks is cleared, as well as the area over the tracks themselves. Using these measures, the street surface is free from snow in practically the entire width, for the whole winter. The railway also keeps open 140 miles of highway, over which its buses operate.

Tampa Betters Safety Record

SAFETY work in Tampa, which brought the Tampa Electric Company the Brady Award for 1927, had even better results in 1928. In the latter year there was a total of 820 car and bus accidents, as compared with 1,175 occurring in 1927, 2,843 in 1926 and 3,070 in 1925. This represents an improvement in 1928 over 1927 of 30 per cent, over 1926 of 71 per cent, and over 1925 of 73 per cent. From the comparative record of acci-



At the South Florida Fair the Tampa Electric Company had an exhibit which included a moving picture booth at which safety pictures were shown

dents, it appears that of the years 1914 to 1928 inclusive, the smallest number of accidents occurred in 1928. Also, during 1928 a far greater number of miles was operated per accident than was operated at any time during this fifteen-year period. The figures indicate an improvement in miles operated per accident during 1928 over 1927 of 35 per cent, over 1926 of 184 per cent, and over 1925 of 264 per cent.

The reduction in collisions with vehicles is particularly notable. In 1925 there were 2,597 such collisions, in 1926 there were 2,458 collisions, in 1927 1,021 collisions, and in 1928 only 691. These figures indicate an improvement for 1928 over 1925 of 280 per cent in miles operated per collision with a motor vehicle. The automobile registration in the two years was approximately the same. The latter year also shows a substantial reduction in other classes of accidents as compared with the three previous years.

The total expense of settlement of suits, judgments and claims was $9,940 in 1928, as compared with $35,135 in 1927, and approximately the same amount in each of the two preceding years. The total accident costs have been reduced from $56,290 in 1925, $62,182 in 1926 and $57,237 in 1927, to $25,236 in 1928. This is a reduction of approximately 60 per cent. The cost of accidents per vehicle-mile for the four years was 1.45 cents in 1926, 1,31 cents in 1926, 1.49 cents in 1927 and 0.65 cents in 1928. With an accident reserve accumulation of $60,000 at the end of 1928, it has been possible to reduce the accrual basis from 5 per cent to 3 per cent of the revenue from transportation. This record of reduction in accident costs has been obtained with a reduction in the cost of safety work from $5,448 in 1927 to $4,799 in 1928.

Safety work has been carried on by the Tampa Electric Company for many years. In a summary of the presentation for the Brady Award last year made in Electric Railway Journal for Jan. 26, 1929, page 161, were listed the several plans used up to the end of 1927. The program has been continued during the past year.

During 1928 blinker stop signs were installed at street intersections of the most important through thoroughfares. Clearance lines at curves are now painted on the street surface in yellow instead of white, which was the same color as that used by the city in marking street intersections, parking places, etc. It is believed that this change prevents confusion with other lines painted on the pavements.

In connection with the annual South Florida Fair, the company, in its exhibit in 1928, showed the front end of a street car. Inside it motion pictures and lantern slides were displayed on a screen. Two short films were run, along with slogans. It is estimated that between 18,000 and 20,000 people saw the exhibit during the ten-day period of the exposition.

Beginning with 1928, a new contest among the trainmen was begun. This plan has as its reward a monthly prize of $5 to each man of the car or bus line which operates the greatest number of miles per accident. The extra men are also divided into groups, and the members of the winning group are likewise given a prize of $5 each. This contest has proved very successful, and tends to keep interest aroused where it has perhaps lagged a little during the four-month bonus contests which were described in the article last year. Under the rules of the contest, all accidents are counted, whether chargeable or non-chargeable. In the case of unreported accidents, a regular man is disqualified from participating in any earnings of the line for that monthly period in which the unreported accident occurred.

Whenever a line makes a poor showing in the line contest for two months in succession, class meetings are held for the men from that line, in which every phase of the operation is discussed, together with the possible accident hazards, in order to ascertain if possible the reason for the line's poor showing. These classes have been found very beneficial and have always resulted in improvement for the lines that have been making a poor showing.

In the work of the shops, one of the most noteworthy accomplishments for safety during 1928 was the adoption of the system of keeping all cars and buses on the same run daily. It is believed that when a man is entirely familiar with his car by the daily use of it, he naturally will handle it with a greater degree of safetly. This system has also helped in reducing car defects, and improving the reliability of the service.

Tide Water Power Company Extends Safety Measures

DESPITE continually increasing congestion on streets and highways the Tide Water Power Company of Wilmington, N.C., maintained the excellent record during 1928 that it had established in winning the Brady Award in its class in the two preceding years. This company always has laid great stress on resuscitation of persons suffering from electric shock or suffocation in drowning. It was a pioneer in adopting the Schaeffer prone pressure method and has extended its service to neighboring industries and the general public. The company owns and operates a large bathing pavilion at Wrightsville Beach and maintains lifeguards for the protection of the public. It also has shown during the bathing season a one-reel picture, "Artificial Respiration," every eighth evening. Reports have come back from many southern states illustrating the peculiar effectiveness of this method of visual instruction.

The company also co-operates with the safety departments of the railroads and industries located in the city as well as with the local Y.M.C.A. In the company's employee school for vocational training and safe practices, the employees of other companies are welcome to receive instruction without charge.

Particular attention is directed toward all locations where accidents are likely to occur. Where the view of the track is obstructed special precautions are taken. Where a hedge is permitted to obscure the view at a crossing a continuous agitation for its trimming or removal will begin, and will be continued until the risk is eliminated or abated. Signs are placed at important points along the lines of the company giving full directions as to speed and control of the cars. It is believed that this has enabled employees to make better than average time with little if any extra hazard.

The company bettered its record of accidents from 46 in 1927 to 45 in 1928. There have been no fatalities on the properties for four years. Expressed in proportion to gross revenue the cost of accidents was 1.366 per cent for the year 1928. The claim department operations

and miscellaneous expense were 0.537 per cent of the 1928 gross earnings.

In 1928 the bonus system for rewarding trainmen and bus drivers for safe operation met with great success. Of the 34 regular operators 15, or 44 per cent, held perfect safety records. Of the average number of 48 total operators, 43 received some reward for safe operation. The plan provides for the payment of $1 to each operator for each no-accident month. In the event that he has an accident he loses all of the accumulated bonus for the year to date, but can start over the next month. There is an additional bonus of $1 for each no-accident quarter, and $5 extra for a perfect year, making a possible total actual bonus of $21. The cost of this system was $522 in 1928, or less than 1 per cent of the payroll.

Louisville Men Have New Attitude on Safety

WHILE safety work on the Louisville Railway during 1928 followed along the same lines as in the past two years, there has been a change in the attitude of the men since the safety program was inaugurated in 1921. At present they are making efforts to operate safely because they have a conviction that safe operation for its own sake is distinctly worth while.

Among mechanical improvements which contribute to safety, the most important during 1928 was the elimination of a grade crossing over which three of the heaviest street car lines operate. Safety of operation has been increased by a change in the color with which the street cars are painted, the present scheme comprising a lemon yellow for the car body with a broad stripe of apple green running around the body and a cross of apple green on the front and rear dashes. Four safety zones have been installed at the principal loading points on Jefferson Street. Air gongs have been substituted on cars operating on important lines for single-tap foot-operated gongs. Treadle doors at the rear of cars on one of the one-man car lines have been installed. Improved destination signs have made it easier for passengers to distinguish routes and have minimized the hazard due to their standing in the street to see if the car approaching is the desired one. Improved springs and locking devices have been installed in electrically operated switches to prevent splitting of switches and subsequent derailment.

Despite an increase in the number of car-miles run from 12,140,867 in 1927 to 12,365,167 car-miles in 1928, the cost of repairs due to accidents was reduced from $7,262, to $6,045.

Comparison of 1928 statistics with those for 1927 shows that the latter year in nearly all respects was the safer. The total charges to the injuries and damages account were reduced from $201,112 to $162,186. The average number of miles operated per chargeable accident went up from 13,326 in 1927 to 17,440 in 1928. In this connection it must be remembered that 1928 was the eighth year of intensive safety effort on the property and comparatively little improvement was looked for.

Indicative of the change of attitude of the employees toward safety is the fact that, of 24 safety rallies held at different carhouses during the year, 22 were arranged by the platform men themselves. Posters and charts



In Louisville a dinner is given each month to the carhouses where 25,000 miles or more are run without an accident. The progress of each carhouse is shown by pins on charts posted on bulletin boards

in the carhouses are found of the utmost value in keeping the enthusiasm for safety of its employees constantly stimulated. One of these shows the average miles operated per accident from 1910 to date. Another is a blueprint which shows the complete safety record of all of the employees. Still another chart is a blueprint showing the standing of each carhouse in the company's monthly accident contest.

During the year a postgraduate course for trainmen was inagurated. This supplements the training of new employees and makes the old employee who takes it a more efficient street railway man. There also has been increased attendance by employees of the company at the Louisville Safety Council's industrial school.

The good will of the company has been enhanced by speeding up the street car service. This was accomplished late in 1927 and early in 1928. In 1927 the company operated 12,140,867 car-miles in 1,433,271 car-hours; in 1928 it operated 12,365,167 car-miles in 1,416,690 car-hours. This was accomplished with the increase in car-miles per accident and decrease in total cost mentioned elsewhere. Besides this general improvement in speed, an express service was inaugurated on one of the company's main lines during the year. For four miles in the center of the main route the street cars make no stops at streets other than transfer points, local service being given by buses.

El Paso System Increases Zero Accident Days

DURING the year 1928 the El Paso Electric Company bettered its record for any previous year, having a total of 435 accidents as compared with 445 in 1927, and 452 in 1926. This compares with 1,767 in 1921, the earliest year for which statistics were presented. Accidents were at the rate of 1.42 per 10,000

car-miles, and 2.35 per 100,000 passengers carried. The figures for 1928 represent an improvement of approximately 8 per cent in the factor of safety over the medal winning year, 1926. Reviewing results for the past eight years, the company's presentation states that accidents per 100,000 passengers carried and per 10,000 car-miles operated have been reduced more than 75 per cent.

During 1928 earnings were increased to the extent of $12,752, and expense was reduced by $18,614, through accurately fitting service to conditions. The company operated 233,452 car-miles less and hauled 76,516 passengers more in 1928 than during the previous year. Faster schedules offset lengthened headways and readjustments were followed by a further reduction of the number of street car and bus accidents.

For years it has been the practice of this company to set an accident bogey. By the beginning of 1928 so much progress had been made towards the goal of accidentless transportation that no bogey was set and the men were simply urged to do their best to "beat last year's accident record." This they did, lowering the record for 1927 by ten accidents.

That the efforts towards the reduction of accidents have been appreciated in the city of El Paso is evidenced by the many expressions of good will included in the report. The results did not follow a spurt or any series of spasmodic efforts during which spectacular improvements were shown. On the contrary, progress along safety lines was shown by regularly bettering the established accident record year after year, notwithstanding that these records have already been recognized as among the best.

Warning signs, the exercise of tact and courtesy, and extra precautions taken to prevent accidents have played an important part in the program. Careful inspections have been made, special instructors have taught student operators and a joint committee on investigating accidents has been active. Operators are continually on the alert and report all unsafe conditions. Various safety devices have been adopted, quite a few of which were developed by the men in the ranks.

Outstanding benefits have been secured through the company's honor roll and gold star merit system. A day off with pay once each month is the privilege of operators on the honor roll, and this has led to greatly increased efficiency and improved safety. The safety banquets which are held periodically have increased the interest of the men in accident prevention work, and the numerous safety contests conducted have resulted in materially lowering the number and seriousness of accidents.

One of the outstanding features of the safety contest was the establishment of a record for zero days, or days on which no accidents occurred. The company had a total of 117 such days in 1928. This means that the street cars and buses were operated about a third of the total number of days in the year without an accident of any kind. The goal which the company has set is to operate seven consecutive days without an accident. There were eight days in June, 1928, in which only one accident occurred, and in the last eleven days of December eight were operated without an accident. All the employees are now determined to make the seven consecutive days without an accident a reality. The result has been to stimulate a renewed interest in safety among all employees, which has materially lessened the number and seriousness of accidents in which the street cars and buses are involved.

Lower Insurance Rates In Effect

NEW fire insurance rate schedules for electric railways are now in effect in 42 states, according to the announcement made at a meeting of the committee on insurance of the A.E.R.A., held at Baltimore Jan. 10. In three other states the new schedule has been tentatively adopted and test applications are being made. In three additional states the schedule has not been filed because of litigation; and in one state there are no traction lines rated.

Fire Insurance Rate Schedule—Revision of May, 1929

In Use

Maine	North Carolina	Arkansas
New Hampshire	South Carolina	Nebraska
Vermont	Georgia	Oklahoma
Massachusetts	Florida	Texas
Connecticut	Alabama	Wyoming
Rhode Island	Mississippi	Colorado
New York	Louisiana	New Mexico
New Jersey	Ohio	Montana
Pennsylvania	Tennessee	Utah
Delaware	Indiana	Arizona
Maryland	Wisconsin	Washington
Dist. of Columbia	Illinois	Oregon
Virginia	Minnesota	California
West Virginia	Iowa	Nevada

Michigan, North Dakota, South Dakota — Tentatively adopted. Test applications being made.

NOTE— Missouri, Kansas, Kentucky — Because of litigation, schedule not filed.

Idaho—No traction lines rated.

Changes in this new schedule as compared with that previously in effect are as follows:

The base rate "A" for incombustible buildings has been reduced 50 per cent.

The base rate "B" on other structures has been reduced 16⅔ per cent.

More favorable treatment has been accorded buildings of superior construction (rated under base rate "A") and deficiency charges for such buildings have been lowered in numerous instances.

Occupancy charges for motor buses (items 31 t,u) have been lowered 25 per cent and 20 per cent respectively, with all occupancy charges reduced 50 per cent when in incombustible buildings.

Watchman deficiency charge has been reduced 50 per cent when base rate "A" is used.

External protection charges are reduced one-half when base rate "A" is used.

Deductions have been introduced for semi-steel cars.

A 33⅓ per cent reduction has been allowed in the base rate for rolling stock (1) on tracks and (2) in yards.

Charges covering defective wiring and heaters for cars on tracks have been reduced 50 per cent under stated conditions.

Baltimore Rate Decision

Sanctions Larger Earnings

United States Supreme Court approves 7½ to 8 per cent return on present fair value. Similar basis held to be proper for setting up depreciation

PRINCIPLES which may have a far-reaching effect upon the electric railways and the entire utility industry in this country were laid down in the recent decision of the United States Supreme Court in the rate case of the United Railways & Electric Company of Baltimore. Not only did the court sustain the primary contention of the company that a return of 7.44 per cent was no more than fair and reasonable but it went further and declared that a return of 7½ to 8 per cent is not unreasonable or excessive. Concerning depreciation, the second point at issue, the court stated specifically: "This naturally calls for expenditures equal to the cost of the worn-out equipment at the time of replacement; and this for all practical purposes means present value." The position previously taken by the court, that reproduction cost must be considered in determining valuation, was reaffirmed, but the wording of the decision was not specific and definite on this subject.

More than two years have elapsed since the first step was taken in the long series which led ultimately to the victory of the company in the nation's highest court. In August, 1927, the company applied to the Maryland Public Service Commission for an increase in fare from 7½ cents to 10 cents.

The old 5-cent fare remained in effect in Baltimore until 1918, when this rate was increased to 6 cents. In the following year it was raised to 7 cents with two tokens for 13 cents. On Jan. 1, 1920, the token rate was withdrawn, and the fare became 7 cents straight. This rate continued until 1924, when the company was authorized to increase it to 8 cents with two tokens for 15 cents. Even this failed to yield a fair return on the investment and the company therefore requested permission to charge a 10-cent flat fare.

In response to this application the commission in February, 1928, ruled that the company could charge a cash fare of 9 cents, with three tokens for 25 cents. At that time the commission fixed the depreciation charge at $883,544, basing it on original cost. The company took the case to the Circuit Court, which in May held the rates granted by the commission were confiscatory and that depreciation should be based on present value. The commission then filed an appeal and the case went to the Court of Appeals of Maryland.

The Court of Appeals reversed the Circuit Court and upheld the contention of the commission that a fare calculated to yield a return of approximately 6.26 per cent is adequate. In the matter of depreciation, however, the Court of Appeals upheld the lower court and overruled the contention of the commission that depreciation should be figured on the basis of original cost. Both sides then appealed to the United States Supreme Court, the company in order to secure a rate of return higher than 6.26 per cent and the commission in order to win its point that depreciation should be calculated on original cost.

The decision of the United States Supreme Court, announced on Jan. 6, 1930, sustained the decision of the Maryland Court of Appeals that depreciation should be calculated on present value, but reversed the latter's ruling that 6.26 per cent constitutes an adequate return. In discussing this subject the Supreme Court stated:

"The commission fixed a rate of fare permitting the company to earn a return of 6.26 per cent on this valuation; and . . . the case resolves itself into the simple question whether that return is so inadequate as to result in a deprivation of property in violation of the due process of law clause of the Fourteenth Amendment. In answering that question, the fundamental principle to be observed is that the property of a public utility, although devoted to the public service and impressed with a public interest, is still private property; and neither the corpus of that property nor the use thereof constitutionally can be taken for a compulsory price which falls below the measure of just compensation. One is confiscation no less than the other.

"What is a fair return within this principle cannot be settled by invoking decisions of this Court made years ago based upon conditions radically different from those which prevail today. The problem is one to be tested primarily by present-day conditions. Annual returns upon capital and enterprise, like wages of employees, cost of maintenance and related expenses, have materially

There is much evidence in the record to the effect that in order to induce the investment of capital in the enterprise or to enable the company to compete successfully in the market for money to finance its operations, a net return upon the valuation fixed by the commission should be not far from 8 per cent.

—From decision of U. S. Supreme Court.

increased the country over. This is common knowledge. A rate of return upon capital invested in street railway lines and other public utilities which might have been proper a few years ago no longer furnishes a safe criterion either for the present or the future. Nor can a rule be laid down which will apply uniformly to all sorts of utilities.

What may be a fair return for one may be inadequate for another, depending upon circumstances, locality and risk. The general rule recently has been stated in Bluefield Co. vs. Pub. Serv. Comm., 262 U. S. 679, 692-695:

It is manifest that just compensation for a utility, requiring for efficient public service skillful and prudent management as well as use of the plant, and whose rates are subject to public regulation, is more than current interest on mere investment.

—From decision of U. S. Supreme Court.

"What annual rate will constitute just compensation depends upon many circumstances and must be determined by the exercise of a fair and enlightened judgment, having regard to all relevant facts. A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally.

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"Investors take into account the result of past operations, especially in recent years, when determining the terms upon which they will invest in such an undertaking. Low, uncertain or irregular income makes for low prices for the securities of the utility and higher rates of interest to be demanded by investors. The fact that the company may not insist as a matter of constitutional right that past losses be made up by rates to be applied in the present and future tends to weaken credit, and the fact that the utility is protected against being compelled to serve for confiscatory rates tends to support it. In this case the record shows that the rate of return has been low through a long period up to the time of the inquiry by the commission here involved."

"What will constitute a fair return in a given case is not capable of exact mathematical demonstration. It is a matter more or less of approximation about which conclusions may differ. The court in the discharge of its constitutional duty on the issue of confiscation must determine the amount to the best of its ability in the exercise of a fair, enlightened and 'independent judgment as to both law and facts.' . . .

"There is much evidence in the record to the effect that in order to induce the investment of capital in the enterprise or to enable the company to compete successfully in the market for money to finance its operations, a net return upon the valuation fixed by the commission should be not far from 8 per cent. Since 1920 the company has borrowed from time to time some $18,000,000, upon which it has been obliged to pay an average rate of interest ranging well over 7 per cent and this has been the experience of street railway lines quite generally. Upon the valuation fixed, with an allowance for depreciation calculated with reference to that valuation, and upon the then prescribed rates, the company for the years 1920 to 1926, both inclusive, obtained a return of little more than 5 per cent per annum. It is manifest that just compensation for a utility, requiring for efficient public service skillful and prudent management as well as use of the plant, and of which the rates are subject to public regulation, is more than current interest on mere investment. Sound business management requires that after paying all expenses of operation, setting aside the necessary sums for depreciation, payment of interest and reasonable dividends, there should still remain something to be passed to the surplus account; and a rate of return which does not admit of that being done is not sufficient to assure confidence in the financial soundness of the utility to maintain its credit and enable it to raise money necessary for the proper discharge of its public duties. In this view of the matter, a return of 6.26 per cent is clearly inadequate. In the light of recent decisions of this Court and other federal decisions, it is not certain that rates securing a return of 7½ per cent or even 8 per cent on the value of the property would not be necessary to avoid confiscation. But this we need not decide, since the company itself sought from the commission a rate which it appears would produce a return of about 7.44 per cent, at the same time insisting that such return fell short of being adequate. Upon the present record, we are of opinion that to enforce rates producing less than this would be confiscatory and in violation of the due process clause of the Fourteenth Amendment."

From these views Mr. Justice Brandeis and Mr. Justice Holmes dissented. Their dissent, however, appears to have been based upon a difference of opinion concerning valuation and proper allowance for depreciation rather than upon the belief that a return of 6.26 per cent is adequate. In fact, Justice Brandeis' statement refers to a return of 7.78 per cent upon the figure which he considers to be the fair value of the property.

Concerning the method which should be used in setting up depreciation the language of the decision is explicit. The Court states:

"The allowance for annual depreciation made by the commission was based upon cost. The Court of Appeals held that this was erroneous and that it should have been based upon present value. The court's view of the matter was plainly right. One of the items of expense to be ascertained and deducted is the amount necessary to restore property worn out or impaired, so as continuously to maintain it as nearly as practicable at the same level of efficiency for the public service. The amount set aside periodically for this purpose is the so-called depreciation allowance. Manifestly, this allowance cannot be limited by the original cost, because, if values have advanced, the allowance is not sufficient to maintain the level of efficiency. The utility 'is entitled to see that from earnings the value of the property invested is kept unimpaired, so that at the end of any given term of years the original investment remains as it was at the beginning.' . . . This naturally calls for expenditures equal to the cost of the worn-out equipment at the time of replacement; and this, for all practical purposes, means present value. It is the settled rule of this Court that the rate base is present value, and it would be wholly illogical to adopt a

different rule for depreciation. As the Supreme Court of Michigan, in Utilities Commission vs. Telephone Co., 228 Mich. 658, 666, has aptly said: 'If the rate base is present fair value, then the depreciation base as to depreciable property is the same thing. There is no principle to sustain a holding that a utility may earn on the present fair value of its property devoted to public service, but that it must accept and the public must pay depreciation on book cost or investment cost regardless of present fair value. We repeat, the purpose of permitting a depreciation charge is to compensate the utility for property consumed in service, and the duty of the commission, guided by experience in rate making, is to spread this charge fairly over the years of the life of the property.' "

It is the settled rule of this Court that the rate base is present value, and it would be wholly illogical to adopt a different rule for depreciation.

—From decision of U. S. Supreme Court.

From this opinion Justices Brandeis and Holmes again dissent and also Mr. Justice Stone in a separate opinion. Their objections appear to be based on general disagreement with the reproduction cost theory of valuation, and present value as the basis for depreciation allowance.

In the matter of valuation the language of the decision is open to some difference in interpretation. The statement is made that "it is the settled rule of this court that the rate base is present value." In the opinion of lawyers representing the United Railways & Electric Company, this is a reaffirmation of the stand taken by the Court in the St. Louis & O'Fallon Railroad case when it upset the valuation of the Interstate Commerce Commission because sufficient consideration had not been given to the matter of reproduction cost. It appears also to refer back to the Indianapolis Water Company case wherein the Supreme Court held "if the tendency or trend of prices is not definitely upward or downward and it does not appear probable that there will be a substantial change of prices, then the present value of lands plus the present cost of constructing the plant, less depreciation, if any, is a fair measure of the value of the physical elements of the property."

The exact procedure for putting into effect the decision of the United States Supreme Court remains in doubt at this time. It appears probable that the United States Court will transmit its rulings to the Maryland Court of Appeals and thence to the Circuit Court, resulting in the issuance of a permanent injunction to restrain the Public Service Commission from interference with the collection of a 10-cent flat fare by the United Railways & Electric Company of Baltimore.

Engineering Executive Committee Receives Committee Reports

SEVERAL subjects of importance were taken up at the regular meeting of the executive committee of the American Electric Railway Engineering Association held in New York on Jan. 9, 1930.

Reports were received from the standing committee in charge of the several divisions of association work, and it appeared evident from them that every effort is being made to speed the reports this year to have them ready in time for the annual convention to be held in June.

On account of the withdrawal of the New York State Railways from the American Electric Railway Association, F. McVittie tendered his resignation from the Engineering executive committee. His resignation was accepted with regret. To fill the vacancy thus created Walter Bryan, superintendent of power, St. Louis Public Service Company, was nominated and unanimously elected. It was provided, however, that the remaining members of the executive committee be advanced in positions, since Mr. McVittie was a ranking member at the time of his resignation.

Resolutions were presented and adopted on the death of G. W. Palmer, Jr., who was the only honorary member ever elected by the executive committee of the Engineering Association.

A number of matters pertaining to the American Standards Association were taken up. Having completed this assignment the committee on special track work was discharged. C. W. Squier was appointed as the association's representative on the committee on machine pins. On the subject of hacksaw blades the proposed standardization prepared by E. P. Goucher was adopted for submission to the American Standards Association. On account of the proposed change in the method of testing steel and malleable iron pipe unions of standard weight, this subject also was referred back to Mr. Goucher. New designs of axles which were proposed were withheld from the Manual pending a discussion with the American Railway Association.

Considerable discussion developed relative to the program of the annual convention to be held in San Francisco next June. According to the plan adopted by the American Association, sessions of the Engineering Association will be held Monday and Wednesday afternoons and Thursday morning. As to the division of time among various subjects, the matter was left to the committee on convention program, of which F. H. Miller is chairman.

Discussion developed as to whether the subjects of motor buses and wood preservation should be reorganized as separate divisions of the Engineering Association, instead of special assignments under the rolling stock and way and structures divisions, respectively. This was referred to a committee consisting of A. T. Clark, chairman; P. V. C. See, and E. M. T. Ryder.

Revisions of the constitution and by-laws and the rules and regulations for committees were adopted at the last convention and referred to a committee on editing consisting of R. C. Cram and C. R. Harte. A report of the committee on editing was presented by Mr. Cram. The proposals were principally changes in wording to clarify the meaning and to insure uniformity. They were tentatively approved by the executive committee for printing in proof form and submission to the membership for approval.

Members present at the meeting included President W. W. Wysor, Vice-presidents L. D. Bale and C. H. Jones, Secretary-treasurer G. C. Hecker, E. M. T. Ryder, H. H. George and A. T. Clark. T. H. Nicholl, C. S. Stackpole, L. C. Winship and R. C. Cram, representing committees, A. W. Baker of headquarters staff and Morris Buck of ELECTRIC RAILWAY JOURNAL also were present.

New Albany Car Includes Many

By

R. S. BEERS

Transportation Engineering Department
General Electric Company

DIFFERENCES of many kinds from conventional designs are found in the new car which has been operating for some little time on the lines of the United Traction Company, Albany, N. Y. The outstanding features are the extensive use of aluminum and its alloys in the body construction, and the driving motors and type of control.

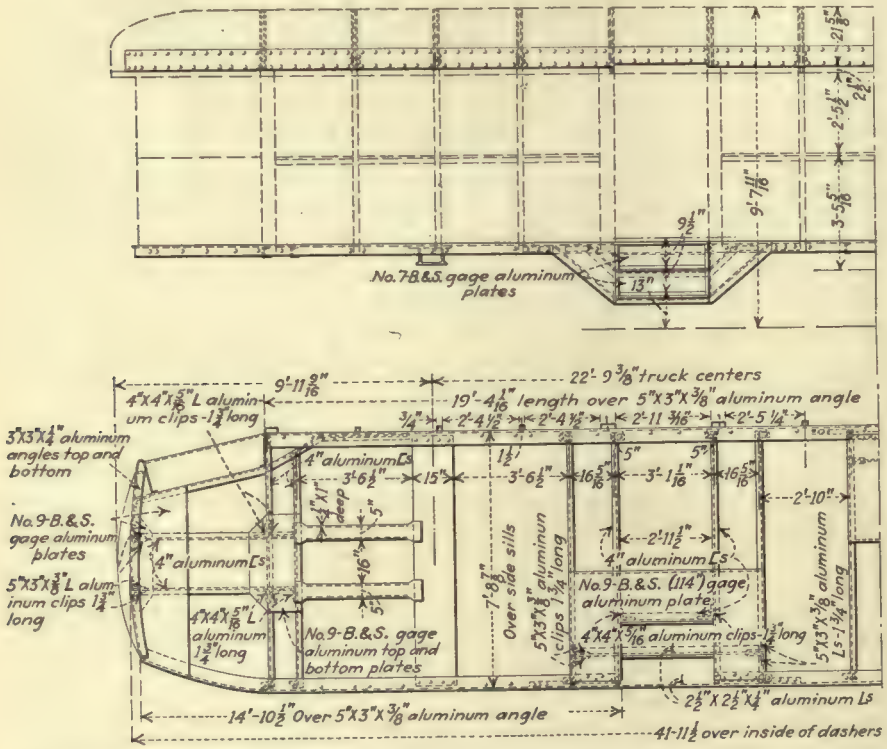
Particular care has been taken to make the car interior attractive. The miscellaneous parts of the electrical equipment, such as the control devices and switches, have been grouped and placed in a cabinet in each vestibule, with a convenient table top which not only conceals the equipment but provides a place for the operator to lay his transfers, punch and other paraphernalia.

Tests made have shown that the service performance of the car is also somewhat unusual. The free running speed is 32 m.p.h., which is attained with a rate of acceleration on the control points of 3.5 m.p.h.p.s. Stops with the service brake are at the rate of 2.5 m.p.h.p.s., but when emergency braking is used, combining both air and magnetic devices, the rate obtained may be as high as 6 m.p.h.p.s.

In order to obtain minimum weight, aluminum and its alloys have been used extensively in the car body and framing, many parts being made entirely of such materials. In the following discussion, where aluminum is referred to it is understood that the term includes not only pure aluminum, but the various alloys of the metal which have been brought out by the Aluminum Company of America and which have been designated by it as suitable for the part in question.

The side sills are formed of 3x5x$\frac{1}{8}$-in. aluminum angles, extending in one continuous piece from front body corner posts to center exits and from center exits to rear vestibule corner posts on both sides of the car. The cross sills are formed of 4-in. aluminum channels. These are fastened to the underside of the side sill angle. The body end sills are formed of two 4-in. aluminum channels spaced on $10\frac{5}{16}$-in. centers, fastened to the body side sills with top and bottom center gusset plates riveted to the end sills and platform center sills.

The center exits are reinforced with additional longitudinal sills and plates, forming a step well. A 4-in. aluminum channel is placed at the junction between the floor plate and the top step well. This runs the full length of the center exit and is connected by angle clips to the body cross sill and riveted to the floor plate. The center exits each have a floor cover plate of No. 9 gage aluminum, flanged on the inside, and extending from within 4$\frac{1}{2}$ in. of the center line of the car to the side sills and between the main body cross sills on the two sides of the center exit. The step hangers, risers and tread plates are formed of No. 7 gage aluminum flanged at the ends.



Aluminum is used extensively in the framing of the Albany car. Rolled, extruded and cast sections of various alloys are employed

General Dimensions of the Albany Car

	Ft.	In.
Length over all	42	8½
Length over dashers	41	11½
Length over body	32	11½
Length of platforms	4	5 13/16
Bumper projection		4½
Truck centers	22	9½
Wheelbase of truck	5	4
Wheel diameter		26
Post centers		30
Vestibule door openings between posts	4	0½
Side exit door openings, between posts	2	11 3/16
Width over all	8	2½
Width over side sills	7	8½
Width over vestibule corner posts	7	0½
Width of aisle		22
Width of seats		35
Height, rail to top of trolley boards	9	11 5/16
Height, rail to under side of sill		27 5/16
Height, rail to bottom of apron		23½
Height, floor to headlining	6	9½
Height, rail to first step, end door		17
Height, first step to platform, end door		15
Height, rail to first step, center exit		13
Height, first step to second step, center exit		9½
Height, second step to car floor, center exit		9½
Seating capacity	44	

Innovations

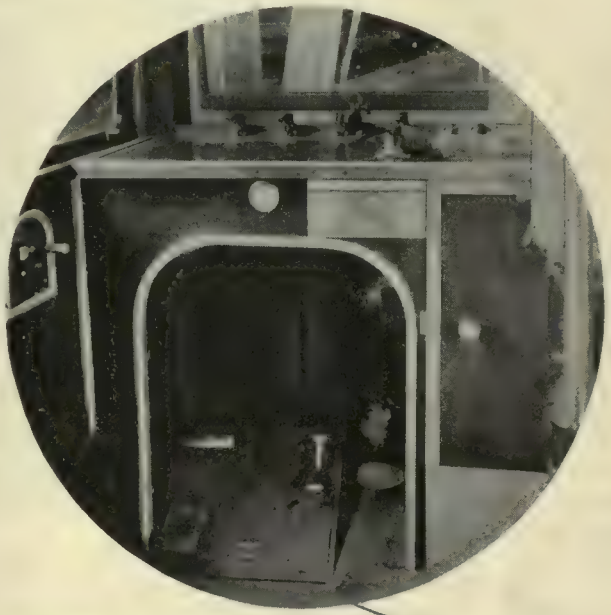
The open side of the platform is supported by a built-up knee, formed of No. 7 gage aluminum plate pressed to shape. The top and bottom edges of these knees are reinforced by a 2x2x¼-in. steel angle riveted to them. The knees are further braced with a No. 7 gage aluminum hanger plate, flanged on the inside edge for connecting to the knee and then around the outside of the side sill angle.

The center sills at the front and rear ends of the car extend through the body end sill to the buffer sills, and are formed of 4-in. aluminum channels, connected with angle clips. The body end sills are further braced with two ¼-in. pressed 5-in. aluminum channels laid flatways and extending from the end sill to the body bolsters being bolted to them. The closed side of the platform is formed by a continuation of the side sill angles. The platform ends at each end of the car are reinforced with No. 9 gage aluminum nosing plates for the full width of the car and some 20 in. deep.

Body Framing Is of Aluminum

The body framing also is of aluminum construction. The material includes cast, rolled and extruded sections, heat treated. The side posts are of extruded "U" shaped sections extending from side sill to side plate, bolted and clipped to the side sills. The truss braces between each pair of side posts are of built-up construction, consisting of an aluminum belt rail or sash-rest casting, a body side plate casting and a No. 14 gage, heat-treated aluminum flanged plate riveted to the side sill angle. These individual truss frames form the side body construction and extend from body pier posts to center exit pier posts on both sides of the car. On the closed side of the vestibule cast aluminum belt rails are used, bolted to the corner vestibule posts and body pier posts. These castings have lugs which permit steel diagonal bracing to be used. The side body girder plates and letterboards are of 18 gage aluminum plates held in place by aluminum moldings bolted to the side posts.

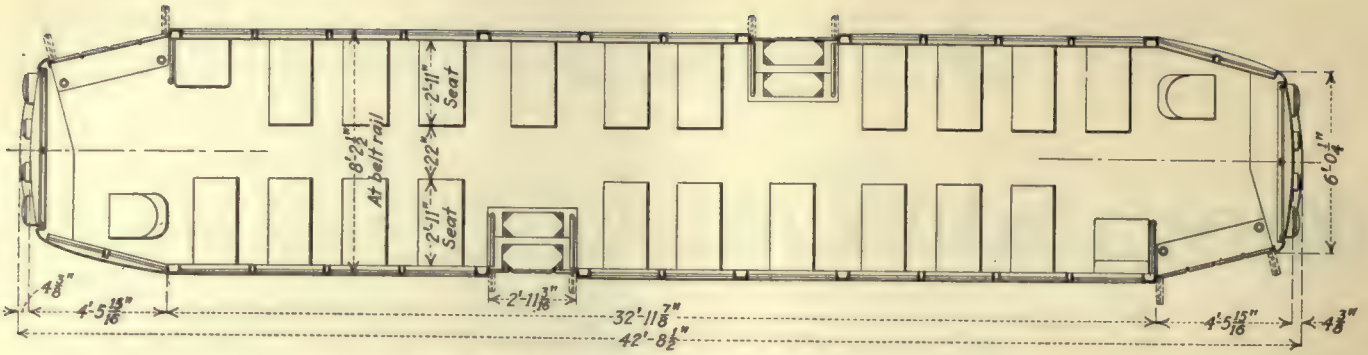
The body side posts are fastened to the roof carlins by cast aluminum shoes bolted to them, forming a continuous member from sill to sill. The side posts are finished on the inside of the car by extruded aluminum pilasters.



The main controller is placed beneath the car floor, the master control being actuated by the left foot. The right foot governs the reverser and the air brake. Only auxiliary devices have to be controlled by hand



Foot-operated control and extensive use of aluminum in the framing are features of this new car for the United Traction Company of Albany, N. Y.



The Albany car is designed to permit of easy entrance and exit.

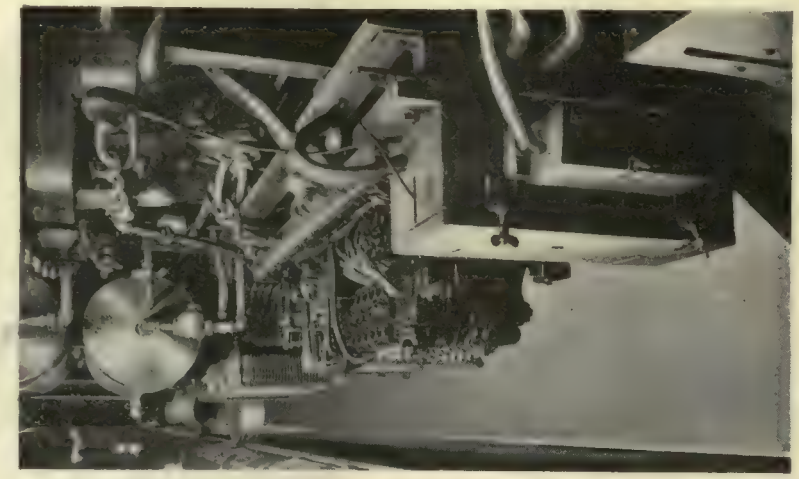
The body corner piers and exit door piers are finished of pressed sheet aluminum pilasters.

The roof is of the arch type with vestibule hoods at each end. A channel shape extruded aluminum carlin is located at each side window and door post, and the ends of these carlins are fastened to the side plate bracing and window posts by cast aluminum brackets. The body roof is sheathed with $\frac{5}{16}$-in. Haskelite the full width of the roof, and in five window-length sections. The hoods are sheathed with $\frac{5}{16}$-in. Agasote cast in two pieces. The outside of the roof is covered with canvas.

The center vestibule posts extend from the buffer sill to belt rail and are of extruded heat-treated aluminum, being tied to the corner posts by diagonals of 2x¼-in. flat steel bar braces. The inside finish of the vestibule below the windows is formed by the aluminum equipment cabinet, while the side vestibule finish is of No. 18 gage aluminum plate. A sign box of cast aluminum is built into the vestibule hood.

The headlining is No. 18 gage aluminum sheet curved to the contour of the roof, jointed on the carlins and covered with aluminum moldings. The advertising card racks are made of No. 18 gage aluminum, forming an extension to the headlining sheets. The edges are covered with aluminum moldings grooved to take standard car cards the full length of the car body.

The doors are made of cherry. Post cappings, pier cover plates and moldings are of aluminum. The wainscoting below the windows consists of aluminum plate. The window stooling is an extension of the cast aluminum truss brace finished with cherry capping.



The controller, reverser, resistors and other equipment are placed under the car convenient for inspection from the pit or the side

Besides the main framing, aluminum is used in a number of details on the car. Spacer rings for the head lamps and housing rings for the marker lights are made of aluminum, as is the sander reservoir.

The seats are of the walk-over type, with a welt divided back. The chair for the motorman is of the bucket type and is adjustable vertically and longitudinally. The seats are upholstered in brown Spanish leather.

The car body is mounted on Cincinnati passenger type arch bar trucks, with spring pedestal cantilever type journal boxes and combination rubber cushions and semi-elliptical spring bolster suspension. The trucks are designed to operate on curves with a minimum radius of 30 ft. The wheelbase is 5 ft. 4 in., and the wheel diameter is 26 in.

General Specifications of Equipment of the Albany Car

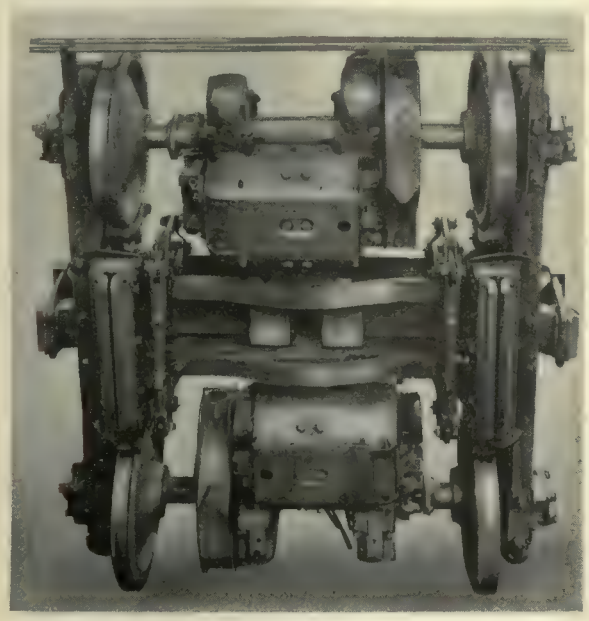
Type of unit	One man, motor, passenger, city double-end, double truck
Number of seats	44
Builder of car body	Cincinnati Car Corp., Cincinnati, Ohio
Weight	32,000 lb.
Body	Aluminum
Roof	Arch
Doors	Folding, center and end
Air brakes	General Electric, foot-operated
Axles	Special
Car signal system	Consolidated buzzer and single stroke bells
Compressors	General Electric CP-27B
Conduit	Flexible duct
Control	General Electric PCM
Couplers	Railway standard drawbar
Destination signs	Hunter, end and side
Door mechanism	Consolidated Car Heating Co., with treadles at center doors
Fare boxes	Johnson, electrically operated
Finish	Ripolin
Floor covering	Flexolith, ⅛ in.
Gears and pinions	General Electric, heat-treated
Glass	Protex, ¼ in. for vestibule DSA for body
Hand brakes	Cincinnati Car Corp.
Gongs	Crewson pneumatic
Hand straps	Leather, white sanitary grips
Heat insulating material	Cork
Heaters	20 inclosed, 500 watts, thermostatic control
Headlights	Golden Glow
Headlining	Aluminum, 18 gage
Interior trim	Nickel-plated, satin finish
Journal bearings	Hyatt roller
Journal boxes	3 x 6 in.
Lamp fixtures	Standard, 20 in series
Motors	Four, GE-265, inside hung
Painting scheme	Red and cream
Roof material	Haskelite; Agasote in hoods
Safety car devices	Safety Car Devices Co.
Sash	Curtain Supply Co., brass
Seats	Hale & Kilburn Walkover
Seat spacing	30 in.
Seating material	Brown Spanish leather
Slack adjusters	Turn buckles
Stanchions and rails	Monel metal pipe
Steps	Stationary
Stop lights	Keystone
Step treads	Kass safety
Trolley catchers	Earll
Trolley base	Ohio Brass Co.
Trucks	Cincinnati arch bar
Ventilators	Railway Utility Co., New Era
Wheels	Steel, 26 in. diameter
Window sash	Curtain Supply Co., brass

Power for driving the car is obtained from four GE-265 motors, one on each axle. These motors are rated at 35 hp. each and make it possible to maintain a high schedule speed. The motors are of the standard, self-ventilated type, geared for a free running speed of 32 m.p.h. at 550 volts. The gear ratio is 68: 15.

Arrangements have been made for foot operation of the G.E. Type PCM control. In practice it has been found that this control has all the flexibility of the hand-operated Type K. The operator can choose practically any speed he desires by stopping on the resistance notches. This may be done by the movement of his foot on the control pedal. Since the brake is controlled with the other foot both hands are free for making change, punching transfers and similar purposes, thus reducing the duration of the stops.

The control was developed to meet the requirements of street railways for faster acceleration without discomfort to the passengers. In general, this improvement has been obtained by increasing the number of resistance steps permitting small increments of accelerating current with a comparatively short time interval on each step and for the total operation. In normal service accelerations as high as 3.5 m.p.h.p.s. are secured. There are nine steps in series and nine in parallel on the main controller. The action is automatic, the master controller having three points, known as switching, series, and parallel. When the operator presses his foot down to the full parallel position the control notches up under the direction of an accelerating relay.

The line breaker, contactors and all of the main control equipment are in a box underneath the car, while the foot-operated master controller is recessed into the toe board. The main contacts are locked in the off position when the reverse lever is removed, just as in the usual hand controller. Normally the acceleration of the car is controlled by the pedal, and, in addition, there is a pilot valve operated by the heel plate which cuts off power in an emergency and applies both air and magnetic brakes.



Under side of the truck, showing the method of mounting the motors and wheel brakes. The double bars between the wheels are the shoes of the magnetic track brakes which may be pulled against the rails independently of the air brakes

The air brakes are of the straight air type with an emergency feature. The usual hand valve is replaced by a foot-operated control valve of the automatic lap type. The novel feature of this valve is that when the pedal is put in any braking position and held there, a definite pressure will be built up and maintained in the brake cylinder without moving the pedal back to a lap position. In other words, the amount of pressure built up depends on the distance the pedal is depressed. There is also a lock so that the pedal may be placed in the full service position and held there, as when the operator is changing ends.

Supplementary braking is obtained by the magnetic track brakes. These consist of four electromagnets mounted between the wheels of each truck. Normally they clear the rail head but they can be lowered on the head and magnetized at the will of the operator. The magnets are energized directly from the trolley and are controlled through the intermediary of pneumatic valves. The retardation obtained by these brakes is thus independent of the motors and control. It does not in any way reduce the effectiveness of the air brakes.

In an emergency both the air and magnetic brakes function together, such a combination allowing for very fast braking without the sacrifice of flexibility or ease of operation. Although the full braking effort is not needed at every stop the operator takes greater advantage of his high accelerating rate when he knows that he can follow more closely behind traffic and get a high rate of retardation if needed.

A bell ringer, a sander and the magnetic track brake are each operated by individual hand valves. The supply of air to these valves is automatically cut off when the pedal is locked so that a passenger on the rear platform cannot tamper with them. Compressed air for operating the control and the auxiliaries is furnished by a CP-27, 15-cu.ft. compressor, suspended beneath the car.

Two circuits, each consisting of twenty lamps in series, furnish illumination for the car interior and for the headlight, destination signs and markers. The lighting fixtures are of the dome type with provision for short-circuiting a defective lamp. A novel feature is that when the motor reverser is turned in changing ends the headlight and other indication lamps are reversed without further attention from the operator.

Straight pneumatic control is used for the door at the motorman's platform, while the center door is handled with automatic treadle control. A four-position rotary valve enables the motorman to select the door-opening combination that he desires. A signal lamp in front of the motorman indicates whether the center door is closed. The door engines are of the direct stroke differential type mounted above the door. Each engine operates a two-leaf door.

The signal buzzer is operated by a pull switch and a cord running down each side of the car. In addition there is a single stroke bell with a push button near the center door so that the passenger can signal the motorman.

There is a conventional stop light on each end of the car, and in addition red lamps are placed over each door connected in the same circuit with the stop light. By this means automobile drivers as well as persons inside of the car, are warned that a stop is about to be made.

The development of this new type of car was initiated by the United Traction Company of Albany, N. Y., which furnished unusual assistance and co-operation to the manufacturers in suggestions and practical demonstrations in operation. The car and trucks were built by the Cincinnati Car Corporation and the electrical equipment was furnished by the General Electric Company.

CORRECT TIMING O

Essential in

Traffic Regulation

PART ONE

THE utility of any traffic signal system depends upon the accuracy with which the system is adjusted or timed to fit the traffic requirements. An examination of the characteristics of traffic flow shows that there are certain demands which should be satisfied in so far as the fluidity and safety of traffic movement is concerned. These may be set forth as follows:

Signals should be timed (1) so as to prevent or reduce to a minimum the accumulation of traffic in any block or series of blocks; (2) in accordance with the relative volume of traffic flow per lane at each intersection; (3) so as to permit in so far as possible the flow of traffic at the speed which is normal for the area traversed; (4) so as to vary with the traffic speed and with the volume throughout the traffic day; (5) so as to prevent, or reduce to a minimum, the simultaneous flow of conflicting streams of traffic, for both vehicular and vehicular with pedestrian movements.

All of these requirements, with the exception of the third, are or may be present at even the simplest type of signal installation—the isolated, independently controlled intersection. Therefore, the problems which arise on an individual intersection must be solved before the problems of a traffic control system can be taken up.

Establishing the Ratio of Times

With respect to any one stream of traffic which flows into a signalized intersection the function of the controlling signal is to *allow* or to *prohibit* the flow of that traffic stream. The relative amounts of time which the signal gives to the controlled stream of traffic to go and to stop form a ratio of time division. Several factors influence the selection of a ratio of time division. The amount of traffic flow in each direction is certainly basic in establishing this ratio. The width of roadway or the number of lanes in which traffic flows is likewise important. The character of the traffic, the nature of the movement and the channelization of flow are factors to be considered.

In this discussion, a simple right-angle intersection is taken for sake of simplicity. Assume all things are equal except the width of the intersecting roadways.

Ignoring clearance periods the proper ratio of movement time for flow of traffic on one street at the intersection with another varies inversely as the roadway widths of the intersecting streets expressed in pairs of traffic lanes. A simple method of application of this principle is to reduce all traffic streams to vehicles per lane on each roadway and then treat all roadways alike.

Let us next assume all things equal except the volume of traffic flow. In this instance the ratio of time divisions varies directly as the traffic flow.

Where complex intersections are dealt with, roadway widths of unequal numbers of lanes can be treated as described above. That is, the traffic flow on all roadways is reduced to vehicles per lane and hence all roadways are reduced to equal terms and treated equally. The division of the cycle then varies directly as the flow per lane. Each artery is then given its part of the available time and is described by its flow per lane divided by the sum of all the other arteries' flow per lane. The available time is ordinarily described as the time of each cycle less the clearance periods. These are discussed later.

The art of traffic engineering has not as yet developed to a point where it is possible to determine accurately the effect on the ratio of time division of such things as the character of traffic flow and the nature of the traffic movement.

The clearance or caution period which is usually indicated either by an amber or by a red light is one of the most important items in the make-up of the complete cycle. As the name of the *clearance* period implies, its primary purpose is to clear the intersection of vehicles and pedestrians that have been moving in one direction at an intersection *in time so as to prevent conflict.* This may mean that the intersection is entirely clear before cross-flow is released, or in any case that the cross-streams are released only after *a sufficient length of time after the clearing stream has been stopped* so as *to prevent conflict.* While the clearance period is largely a safety measure, it is designed to produce both smooth and safe operation.

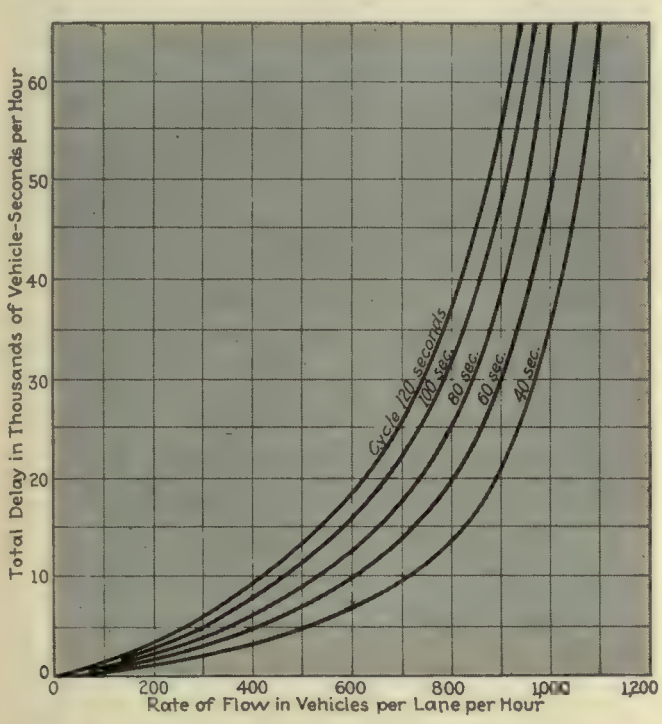
In analyzing these requirements of the clearance period, it is seen that the length of the clearance time is expressed by speeds, distances and stopping times. The length of time required to stop a vehicle is significant in establishing the clearance period. If a stream of traffic which is flowing through an intersection is to be stopped, a sufficient warning time must be given because of the "inertia" effect. That is to say, a moving vehicle cannot be stopped instantly. As a minimum time, then, the clearance period should be long enough so as to permit stopping the vehicles which have been moving. At 20 m.p.h., a speed now accepted for traffic movement in nearly every urban center, a vehicle with adequate

SIGNALS

By

Theodore M. Matson

Chief Engineer City-Wide Traffic Committee
Kansas City, Mo.



Short signal cycles cause less delay than long cycles

brakes can be stopped safely in a distance of 50 ft. and a time of 3.4 seconds. Any vehicle which is closer to the stop line of a signalized intersection than 50 ft. at the instant the caution period begins, would proceed across the intersection. (It is noteworthy that this distance is usually less than the width of the intersection.)

At a simple right-angle intersection the minimum time required for a vehicle to clear the intersecting street may be determined as follows:

Let W = Intersecting street width in feet
V = Speed of clearing vehicle in miles per hour
T' = Clearance time in seconds.

Then $$T' = \frac{W}{\left(\frac{5280\,V}{3600}\right)} = \frac{3600\,W}{5280\,V}$$

$$= \frac{0.682\,W}{V}$$

If the clearing vehicle is 50 ft. or less from the intersection when the signal is thrown and is traveling at 20 m.p.h. it will require additional time. In general if D is the minimum safe stopping distance the maximum clearance time required by a vehicle is

Factors influencing the time ratio and length of cycle at a single intersection are discussed in this article. Timing for signal systems covering a number of intersections will be discussed in a future article

$$T = \frac{0.682}{V}\,(W + D)$$

At complicated intersections there exists frequently a length of free path from the place the cross-flow vehicles are stopped to the point where these vehicles would conflict with the clearing stream; therefore a deduction can be made from the above clearance time.

If d = length of free path in feet to clearing stream
v = average speed of the accelerating cross-flow in miles per hour
and t = amount of time to be deducted

$$t = \frac{0.682}{v}\,d$$

and the clearance time becomes

$$T = \frac{0.682}{V}(W + D) - \frac{0.682}{v}\,d$$

The above equations apply to vehicles only. Usually, however, the pedestrians are requested to obey signals and in these cases a sufficient length of time must be set aside for clearing the pedestrian streams out of danger from released cross-flow vehicles. It is readily seen that, due to the slow movement of pedestrians, the clearance period demanded by them will usually be larger than required by vehicles.

Consider the movement of pedestrians at an intersection across the street in the direction, with respect to the center, which is counter-clockwise. The most severe condition results when this group of pedestrians will have left the curb at an instant prior to the beginning of the clearing period and will be directly in front of the cross-flow vehicles waiting release at the end of the caution period. If no safety zones or isles are provided in the roadway and no parking lanes exist, the distance which these pedestrians must clear during the caution period is the width of the roadway, and, the average walking speed being about 5 ft. per second, the time required would be about one-fifth of this distance expressed in feet. Of course, if safety isles or other places exist in the roadway over which there is no vehicular movement the distance to be cleared is accordingly reduced.

The cycle length to be determined must include the various components which have been discussed heretofore. The total length of the cycle must be adequate to care properly for each of these components. In choosing a length of cycle for an isolated or independent signal installation there is no factor on which to base the cycle length, as is the case in a signal system where the length of cycle must be based on the correlated flow of traffic. The standards set forth in the recommendation of the American Engineering Council, however, set the limits of cycle lengths between 40 seconds and 80 seconds as good practice.

It may be proved mathematically that in any cycle the total delay equals the number of vehicles stopped times half the sum of the delays to the first vehicle and the last vehicle.

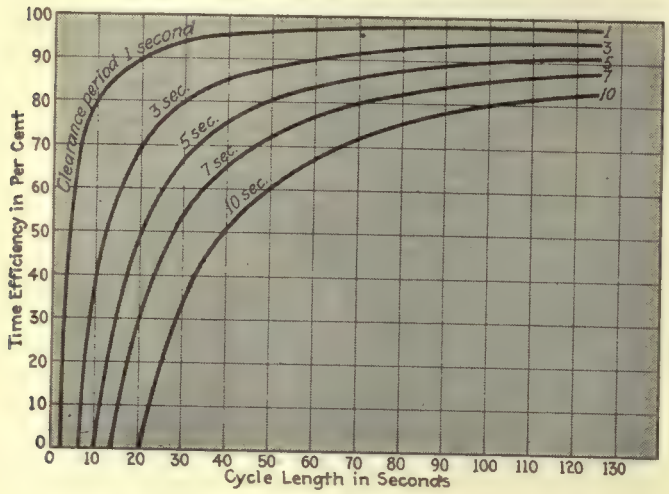
The total hourly delay experienced by one lane of

traffic is, of course, equal to the cyclic delay multiplied by the number of cycles per hour. What this amounts to under various conditions is shown in the following table in which the time spacing of departures is assumed to be three seconds:

Delay in Vehicle Seconds Per Hour Per Lane

Vehicles per Hour	Cycle Length in Seconds				
	40	60	80	100	120
200	1,170	1,980	2,565	3,095	3,780
400	3,420	4,950	6,440	7,925	9,450
600	6,940	9,900	12,915	15,890	18,900
800	13,780	19,800	25,820	31,810	37,800
1,000	36,200	49,500	64,450	79,500	94,500

The time savings of shorter cycles on this basis are evident from the chart on page 83. Of course, the increments in total delay for any cycle length become proportionately heavy for high densities. It will be noted that, making these assumptions, when the rate of flow reaches 1,200 per hour the total delay experienced by any stoppage to the traffic streams is infinite.



Time efficiency with respect to cycle length and clearance

In connection with the choice of cycle lengths it is of interest to note the effect of clearance periods on the useful time that a signal can deliver for various cycle lengths.

Let E = Efficiency or per cent time given to passing additional traffic
C = Cycle length
P = Clearance period

If P is the same for both directions

$$E = \frac{C - 2P}{C}$$

That is, the per cent efficiency of available traffic flow time is equivalent to the total time minus the losses, divided by the total time. This is shown graphically on the chart on this page.

Now, if a part of the traffic wave is temporarily stopped, the first part of the green period, when vehicles pass at capacity spacing, is more valuable than the latter part.

Since the caution period comes at the end of the green period, the subtraction of a few seconds from the green period, which are given over to the caution period, does not materially affect the efficiency of the operation. This is true where traffic is temporarily stopped before the green light shows. However, for continuous movement of the traffic waves, all parts of the green period are equivalent in terms of vehicles.

A.E.R.A. Executive Committee Holds Cleveland Meeting

COINCIDENT with the Annual Meeting of the Central Electric Railway Association, a meeting of the executive committee of the American Electric Railway Association was held at Cleveland on Jan. 24. J. H. Hanna, first vice-president, presided in the absence of President Shoup. Plans for the 49th annual convention of the American Electric Railway Association, to be held at San Francisco, June 23-26, were outlined by Charles Gordon, managing director, and W. V. Hill, manager California Electric Railway Association. Labert St. Clair told of the preparation of publicity material for the convention.

Brief comments on the status of the interstate bus bill and Interstate Commerce Commission railroad consolidation plan were made by Dr. Thomas Conway, speaking for the committee on national relations. Reports were received also from the policy, membership, finance and manufacturers advisory committees. W. E. Wood, chairman publications committee, outlined a plan by which it is proposed to increase the circulation of the association's magazine *Aera* and place it in the hands of a larger number of men in a supervisory capacity in the industry. After considerable discussion of various phases of this project it received the unanimous indorsement of the executive committee.

Preceding the meeting the members of the executive committee were the guests of Col. Joseph Alexander, president Cleveland Railway, at a luncheon at the Union Club. It was decided to hold the next meeting on March 21 at association headquarters, New York.

Anti-Freeze Liquid Changed

FREQUENT trouble has been experienced during the present winter due to freeze-ups in the air brake equipment on cars equipped with anti-freezers. This trouble first made its appearance the latter part of last winter and became more acute this year. The cause of the trouble has been traced to the alcohol used. From the chief chemist of the Prohibition Department, it has been learned that U. S. Formula No. 5, which is generally used in automobile radiators, was modified about two years ago, one of the modifications consisting of adding a small percentage of aldehol, which has a high boiling point. This makes Formula No. 5 a good anti-freeze solution for automobile radiators but has just the opposite effect in preventing freeze-ups in the air brake system of electric railway cars. For that reason it is recommended that U. S. Formula No. 1 should be used to prevent freeze-ups in air brake systems. In so doing it is necessary to clean the anti-freezers thoroughly, so as to insure that all the aldehol is removed.

Second Contest Period Starts

BEGINNING Feb. 1, the second period of the ELECTRIC RAILWAY JOURNAL Maintenance Contest will extend until April 30. Rules were published in the issue of November, 1929. Contributions will be welcomed from anyone in the industry. Watch for announcement next month of the prize winners for the first period.



Train on the Jefferson Avenue line approaching a station. The safety zones are covered with awnings and are well protected

Detroit Express Service

Gains Popularity

By

CLIFFORD A. FAUST

Assistant Editor *Electric Railway Journal*

Public well pleased with express street car service after 28 months of experience on one line and 17 months on a second. Passengers and revenue increase steadily on both lines. Fewer stops and higher speeds facilitate movement of all traffic

WHEN the Department of Street Railways, Detroit, inaugurated express street car service on Jefferson Avenue in September of 1927, using small buses for local service, the plan was looked on rather as an experiment. There were numerous skeptics who predicted a short life for the plan. But in spite of such prognostications, the express service became popular immediately after its introduction and became more so as the months passed.

The best evidence of the success of the Jefferson line was the adoption of a similar plan on Grand River Avenue on Aug. 19, 1928. Like the original installation, this line met with public favor at the very outset and attracted an increasing number of patrons as the people became acquainted with the system. In some measure the immediate acceptance of the Grand River express service was due to the education of the public by the Jefferson line, but by and large, it was occasioned by the higher speed and shorter running time.

Figures from the beginning of the service to the end of 1929 show clearly that the Jefferson Avenue line has enjoyed a very large increase in patronage and that the Grand River line also has built up its riding, in spite of the inauguration of a paralleling high-speed, de luxe bus route. Passenger revenue, as well, has shown corresponding increases on both lines. Measured by these two barometers, patronage and revenue, express service is a successful innovation in Detroit.

Moreover, there is an intangible factor which is reflected in these figures and which is extremely important from the standpoint of the Department of Street Railways. It is the good will obtained by offering an improved service. Aside from the evidence of good will appearing in the operating results, the management has received hundreds of letters, praising the new system and commending the railway for making the change. It is significant that many motorists have stated that they are

leaving their automobiles at home and riding the high-speed trolley lines to get to their places of employment more quickly and more pleasantly. Letters received from regular patrons have also praised the express service from the standpoint of saving time and making a more comfortable ride. Many expressed real pride in riding the lines because they can get to work in less time than neighbors driving automobiles.

Other Benefits of System

In addition to the important results of more passengers and revenue, and an increased amount of good will, the express service has brought about several others. Among these are lower operating expenses, a higher degree of safety, an increase in the street capacity, a speeding of all forms of traffic, and an improvement of public relations, largely by pleasing the motorists and truck drivers.

Operating expenses have been lowered principally through the saving of cars, operators and power. On the Jefferson Avenue line five cars are saved on the base schedule and twelve on the peak. On the Grand River line three cars are saved on the base and ten on the peak. On the individual cars and trains in express service there also is a large saving in energy over full local service because of the elimination of many stops. As shown in the accompanying chart two single cars on the Jefferson line average 2.15 and 2.07 kw.-hr. per car-mile in the express zone, but consumed 4.31 kw.-hr. in the downtown loop and 3.30 kw.-hr. in the local zone. Tests with two trains of a motor car and trailer each showed the energy consumption in kilowatt-hours per car-mile to be 2.65 and 2.43 in the express zone, as compared with 6.03 in the downtown loop and 4.08 in the local zone. These savings are very important, since the line is one of the heaviest traveled in the city.

It has been proved in Detroit that higher speeds of both street cars and buses are attended by fewer accidents. In an accompanying illustration are shown curves for average street car speed and number of accidents over a period of more than one year. As will be seen, the accidents decrease as the speed increases, and vice versa. Greater safety on the express lines may be attributed largely to the fewer loading areas in the street and the greater protection of those at the express stops. Automobiles running through insufficiently guarded loading areas are responsible for a great number of accidents each year, so that elimination of stops is bound to reduce the accidents. The type of safety zones used at the express stops is shown in one of the views reproduced.

On Jefferson Avenue the local transfer buses are permitted to enter the safety zones, but no other vehicles. Passengers at points between the express stops are picked up at the curb, eliminating another hazard.



On Jefferson Avenue express stops originally numbered six each way and averaged one every 0.83 mile. A few added more recently have decreased the spacing slightly. On Grand River Avenue there were originally eleven inbound and twelve outbound stops. Since the discontinuance of local bus service a few more stops have been added

Conditions Affecting Auxiliary Coach Service

Combination express street car and local bus service is still given on the Jefferson Avenue line, but not on the Grand River Avenue line. Coach service was given for a time on the Grand River route, but suspended when it was found that only a few passengers availed themselves of the transfer privilege. Coincident with their

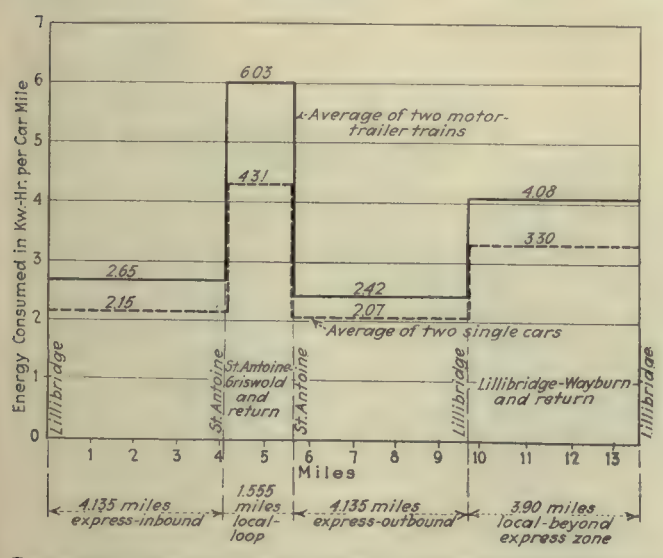
Table I—Revenue, Passengers and Speed of Jefferson Line, October, 1927, to December, 1929

	Rail			Coach		
1927	Revenue in Dollars	Revenue Passengers	Average Speed in M.P.H. including layovers including operation in local zones	Revenue in Dollars	Revenue Passengers	Average Speed in M.P.H.
October	63,460	1,033,179	12.15	14,343	236,992	
November	61,890	1,016,204	12.02	16,064	264,504	
December	66,005	1,083,147	11.00	19,069	313,752	
1928						
January	75,476	1,226,947	11.38	19,776	324,933	
February	73,378	1,193,822	11.53	19,753	324,826	9.88
March	82,057	1,339,562	11.79	21,888	359,703	
April	75,371	1,231,195	11.69	20,908	339,942	9.97
May	79,491	1,298,317	11.55	21,354	346,666	9.90
June	78,082	1,270,205	11.58	21,470	349,285	9.96
July	77,783	1,266,440	11.32	20,467	332,000	9.87
August	76,218	1,240,785	11.38	20,641	334,272	9.85
September	74,415	1,213,655	11.70	18,452	299,299	9.84
October	78,491	1,281,090	11.92	21,269	345,624	9.85
November	79,798	1,304,573	11.86	20,137	326,497	9.94
December	79,116	1,298,538	12.05	20,258	329,539	9.97
1929						
January	87,525	1,424,854	11.78	20,090	325,503	9.86
February	82,369	1,343,854	11.78	19,302	313,340	9.97
March	89,945	1,470,583	11.84	21,191	344,407	9.99
April	88,738	1,448,790	11.94	20,647	335,121	10.07
May	91,760	1,495,638	12.02	20,469	332,311	10.13
June	89,848	1,463,887	11.99	16,234	263,838	10.20
July	88,214	1,435,875	12.24	15,512	251,335	10.24
August	86,642	1,410,938	12.21	15,719	255,098	10.31
September	80,830	1,318,053	12.31	14,453	234,312	10.37
October	81,244	1,330,803	12.14	15,728	255,237	10.33
November	75,011	1,230,436	12.34	14,314	232,924	10.31
December	84,572	1,383,021	11.68	14,908	242,970	10.16

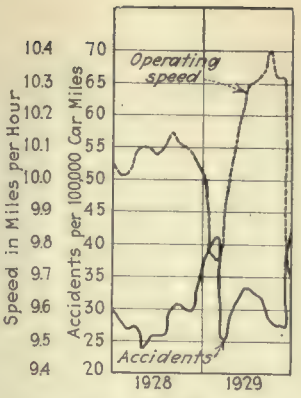
removal a few more stops were added to the street car line. From the very outset of the Jefferson Avenue line there were fewer transfers from local buses to express street cars and cars to buses than the company had expected. Patrons residing within a reasonable distance of the central business district preferred to remain on the local buses rather than make one or two changes. It also was discovered that people would walk a longer distance to an express street car stop rather than bother with taking a transfer bus. The service is maintained by the local buses on Jefferson Avenue now for those who do wish to make the changes and for those who prefer to ride the entire distance by bus.

Passengers Have Increased Steadily

In Table I are given the revenue, passengers and average speed of the Jefferson line for the months of October, 1927, to December, 1929, inclusive. Study



Comparison showing average energy consumed in kilowatt-hours per car-mile by two single cars and two trains of a motor car and trailer each on Jefferson line. Note the much lower consumption in the express zone



Accidents decrease as the speed of street cars increases in Detroit, and vice versa, according to the above curves

of this table shows that with the exception of one month — November, 1929 — both revenue and passengers have increased over the corresponding month of the previous year.

On the Grand River line both revenue and passengers for the street cars have increased, the month of November, 1929, being the only one to show a decrease over the corresponding month in the previous year. Revenue was built up from $102,313 in September, 1928, to $114,969 in December, 1929. Revenue passengers for the corresponding month totaled 1,672,508 and 1,879,760. Coach operation on Grand River Avenue for the period of a little more than five months showed an increase for the first three months and a sharp falling off for the last two. These figures are given in Table II.

Division of revenue and passengers for a typical day early in 1929 on the Jefferson express line is made in Table III. For both railway and coach operation the greatest amount of revenue was collected in cash fares, tickets accounting for a greater portion of the remaining revenue. The ratio of the total railway revenue to coach revenue was approximately 4 to 1. However, the mileage of the street cars was less than 2½ times that of the coaches. Receipts per vehicle-mile for the cars were $0.404 and $0.256 for the coaches; passengers per

Table II—Revenue, Passengers and Speed of Grand River Line, September, 1928, to December, 1929

	Rail			Coach		
1927	Revenue in Dollars	Revenue Passengers	Average Speed in M.P.H.	Revenue in Dollars	Revenue Passengers	Average Speed in M.P.H
September	102,313	1,672,508	11.22	4,912	80,084	9.20
October	113,491	1,854,708	10.77	8,073	130,269	9.76
November	116,203	1,905,170	10.95	10,051	155,206	10.18
December	112,580	1,844,354	10.98	9,336	149,684	10.06
1929						
January	117,193	1,912,535	10.76	5,557	87,862	9.93
	Rail Only					
February	115,274	1,882,987	10.64			
March	125,247	2,045,846	10.87			
April	118,637	1,936,012	10.94			
May	118,104	1,926,714	11.10			
June	110,419	1,799,182	11.23			
July	103,421	1,682,727	11.45			
August	102,934	1,675,313	11.83			
September	104,014	1,696,441	11.63			
October	114,500	1,872,743	11.50			
November	107,583	1,760,567	11.53			
December	114,969	1,879,760	10.85			

Table III—Analysis of Jefferson Express Line on a Typical Day, March 1, 1929

	Railway	Coach
Revenue:		
Cash	$1,588	$477
Tickets	1,392	320
Transfers	155	50
Total	$3,135	$847
Mileage:		
Mileage	7,763	3,302
Receipts per vehicle-mile	$0.404	$0.256
Passengers per vehicle-mile	9.489	5.440
Passengers:		
6-cent passengers	26,461	7,788
Ticket passengers	25,056	5,762
10-cent passengers		94
Jefferson line transfers	1,098	1,476
Other transfers	21,046	2,842
Total	73,661	17,962

Table IV—Detailed Analysis of Grand River Express Operation—Daily Averages of Data for the Weeks from August 20-24 to November 26-30, 1928

Daily Averages For Street Cars	Aug. 20–24	Aug. 27–31	Sept. 4–7	Sept. 10–14	Sept. 17–21	Sept. 24–28	Oct. 1–5	Oct. 8–12	Oct. 15–19	Oct. 22–26	Oct. 29–Nov. 2	Nov. 5–9	Nov. 12–16	Nov. 19–23	Nov. 26–30
Car-miles	9,806	9,944	10,545	10,632	10,832	11,200	11,202	11,202	11,201	11,337	13,286	13,479	13,910	13,617	14,055
Total revenue	$3,404	$3,509	$3,865	$3,626	$3,803	$3,943	$3,884	$3,799	$3,797	$4,007	$4,195	$4,099	$4,106	$4,054	$4,245
Total operating expenses	$2,999	$3,064	$3,178	$3,097	$3,005	$3,198	$3,208	$3,263	$3,309	$3,365	$3,823	$3,775	$3,809	$3,671	$3,828
Net revenue	$405	$445	$687	$529	$798	$745	$676	$536	$488	$642	$372	$324	$297	$383	$417
Revenue per car-mile, dollars	$0.3471	$0.3529	$0.3665	$0.3411	$0.3511	$0.3521	$0.3467	$0.3391	$0.3384	$0.3535	$0.3158	$0.3041	$0.2952	$0.2978	$0.3002
Revenue passengers	55,485	57,272	63250	59,253	62,196	64,445	63,458	61,950	62,204	65,420	68,525	67,240	67,349	66,602	69,455
Transfer passengers	23,470	23,659	24,967	24,404	24,752	23,962	24,618	24,638	24,045	25,319	25,165	26,855	26,348	25,756	26,043
Total passengers	78,955	80,931	88,217	83,657	86,948	88,407	88,076	86,588	86,249	90,739	93,690	94,095	93,697	92,358	95,498
Speed in miles per hour	11.22	11.43	11.69	11.79	11.88	11.98	1.182	11.41	11.25	11.23	10.78	11.22	11.65	11.63	11.62
Combined Car and Coach															
Net revenue—cars	$405	$445	$687	$529	$798	$745	$676	$536	$488	$642	$372	$324	$297	$383	$417
Net revenue—coaches	*$406	*$197	*$154	*$89	*$75	*$85	*$80	*$77	*$92	*$77	*$122	*$109	*$117	*$70	*$76
Net revenue cars and coaches	*$1	$248	$533	$440	$723	$660	$596	$459	$396	$565	$250	$215	$180	$313	$341

*Deficit.

vehicle-mile were 9.489 for the cars and 5.44 for the coaches. Of the 73,661 total railway passengers, 26,461 paid 6-cent fares, 25,056 tendered tickets, 1,098 transferred from Jefferson Avenue coaches and 21,046 transferred from other lines. Of the 17,962 coach passengers, 7.788 paid 6-cent fares, 94 paid 10-cent fares, 5,762 used tickets, 1,476 transferred from the express cars and 2,842 transferred from other lines.

A detailed analysis of the Grand River express operation for the weeks from Aug. 20-24 to Nov. 26-30, 1928, is given in Table IV.

On the Jefferson Avenue line the speed before express operation was started was 12.45 m.p.h.; the speed in the express zone is now 18.4 m.p.h. The running time, which formerly was 20.5 minutes through the express zone of 4.15 miles, has been reduced to 13.5 minutes. On the Grand River line the average speed was increased from 12.15 m.p.h. to 17.36 m.p.h. The running time has been reduced on the section which originally was express, from 32 minutes to 25 minutes. In Table V the running times and average speeds of the Jefferson line for three periods of a typical day in 1928 are given. The speeds are calculated for the outlying local zone, the express zone, the downtown loop and the round trip. It shows an average speed of 18.24 m.p.h. through the express zone, westbound, 18.33 m.p.h. through the express zone, eastbound, and 13.28 m.p.h. for the entire round trip, for the period from 5 a.m. to 6 p.m.

Table V—Running Time and Average Speed of the Jefferson Line, as Operated, on a Typical Day in 1928

	Westbound				Eastbound			
	Local Zone 1.89 Miles	Express Zone 4.15 Miles	Total for Both Zones 6.04 Miles	Downtown Loop 1.55 Miles	Express Zone 4.15 Miles	Local Zone 1.89 Miles	Total for Both Zones 6.04 Miles	Round Trip from Easterly Terminus 13.63 Miles
5:00 a.m.-8:30 a.m. time in min. and sec.	10:54	14:15	25:09	13:48	13:20	9:32	22:52	61:49
Speed in m.p.h.	10.39	17.47	14.41	6.74	18.68	11.90	15.83	13.22
8:00 a.m.-3:30 p.m. time	9:34	12:38	22:12	15:00	13:26	8:50	22:16	59:28
Speed	11.86	19.70	16.31	6.20	18.53	12.83	16.26	13.75
3:30 p.m.-6:00 p.m. time	11:35	13:57	25:32	16:07	14:27	9:44	24:11	65:50
Speed	9.79	17.87	14.18	5.78	17.24	11.64	14.98	12.42
5:00 a.m.-6:00 p.m. time	10:29	13:39	24:08	14:43	13:35	9:11	22:46	61:37
Speed	10.82	18.24	15.01	6.32	18.33	12.34	15.91	13.28



On Jefferson Avenue the local transfer buses run inside the safety zones at express stops. Between these stations they stop at the curb

More Business and How to Get It

Ways of securing additional traffic were theme of annual meeting of Central Electric Railway Association held at Cleveland Jan. 23-24. Other topics of interest were technique of freight handling and employee training

RECOGNITION of the importance of freight business as a source of revenue for the interurbans was a notable feature of the annual meeting of the Central Electric Railway Association, held at Cleveland, Ohio, Jan. 23 and 24. One entire session was devoted to a discussion of means of developing this type of business. Development of passenger business was touched upon by speakers at other sessions.

"Were it not for the freight traffic now carried by the interurbans, and the promising outlook for the continued development of freight business, the future of the interurban industry would indeed be problematical," said William L. Butler, executive vice-president Cincinnati & Lake Erie Railroad. "Success in holding and developing freight business depends upon our ability to give overnight delivery to an ever-widening territory, and upon the enterprise and ingenuity in supplementing our rail service to provide the same or greater convenience, reliability and cheapness of service for prospective shippers as is afforded by our principal competitor, the motor truck, or by the steam railroads."

The speaker also made a point of the necessity of developing an entirely new technique of freight service by the electric railways if they are to hold a position in the transportation industry midway between the steam railway and the motor truck. "Not only must we move freight more quickly, but we must modernize our facilities and operations to move it more economically," said Mr. Butler.

"Much depends upon the development of a closer contact between the company and the shipper," declared H. A. Nicholl, general manager Union Traction Company of Indiana. He expressed the opinion that a great deal can be accomplished in this direction by cutting down the loss and damage of shipments and by effecting quicker settlements where losses are sustained. "Companies are to some extent going into the pick-up and delivery business," stated Mr. Nicholl, and he urged a further extension of this activity, calling his hearer's attention to the clear-cut recommendation of their own committee on the subject made at a previous meeting.

"Don't let your interurban suffer," advised C. L. Van Aucken, editor *Electric Traction,* in a paper on "Interurban Development." "Either kill it or cure it." Citing numerous examples of what had been done in the C.E.R.A. territory the speaker affirmed his faith in the belief that in the majority of cases, if energetic methods are employed, a cure can be effected.

That too many railways have plowed along the same old furrow until it has become a rut was the opinion expressed by Hudson Biery, Cincinnati Street Railway, whose paper on "City Transportation Development" was read by Paul Wilson. "Many of us are trying to render adequate service rather than attractive service," he stated. In discussing the matter of advertising the speaker advised that it should start with a limited program and expand gradually, but, once started, the program should never be allowed to die out entirely.

The program was concluded by a showing of stereopticon slides illustrating methods of handling freight in the C.E.R.A. territory. The showing of the pictures was accompanied by a discussion of the subject by J. K. Coberly, traffic manager of the Columbus, Marion & Delaware Railway.

Fundamental factors affecting the present situation and the future of the electric railway industry were discussed at the opening session. Following a brief address of welcome made by John D. Marshall, Mayor of Cleveland, L. M. Brown, president of the association, presented an encouraging picture of what the future will hold for the industry if it takes advantage of its opportunities. An abstract of his remarks appears elsewhere in this issue.

Charles Gordon, managing director of the American Electric Railway Association, pointed out the necessity of approaching our work with the aim of solving the community transportation problem rather than merely trying to operate electric cars. Since the earliest day when electricity was first used as a source of power, it has never yet been relegated to a secondary position in any field and it is not likely, according to Mr. Gordon, that electricity will suffer defeat in the field of local transportation.

Movement of people, not movement of vehicles, is the ultimate objective, he said. One four-track rapid transit line will carry as many people as 25 express highways. One double-track street car line will carry four times as many people as an express highway. More than 200 years ago, the streets of London were congested because too many people used private transportation vehicles. That was the origin of the first public transportation service. To return now to the use of private vehicles would be a step backward. Intelligent development of public transportation facilities is the only possible solution of the problem.

How public transportation service is being given in Grand Rapids was the subject of a paper by L. J. De

Lamarter, general manager Grand Rapids Railroad, which in the absence of Mr. De Lamarter was read by J. W. Knecht. It was brought out in this paper that modern cars in Grand Rapids have not only decreased operating cost but also attracted new riding.

Selling methods were discussed by E. S. Jordan, Jordan Motor Car Company, who spoke at the morning session on the second day of the meeting. "The great American novel, when it is written, will be written around the story of transportation and communication," he said. "It is a dramatic, romantic business in which we are engaged." The speaker pointed out that civilization is based upon the lowest cost per ton-mile of transportation, and cited numerous examples in the history of transportation to prove his theory.

In a comprehensive and instructive paper on "The Conference Method and Its Use in the Training of Employees," E. G. Cox, director of service improvement, Chicago, North Shore & Milwaukee Railroad, told of the development of the conference training methods with particular reference to the manner in which it was applied on the property which he represented. Dividing his paper into four general parts he discussed, in turn, what the conference method is, why it is used, how it operates, and what it accomplishes.

"Contrary to the accepted thoughts of a few years ago," said the speaker, "the important period of training the employees does not end with the close of the probation period. The vestibule instruction of a new man, although highly important, is not now regarded as the beginning and the end of the training period. Rather the training process goes on and on as long as the service of the employee, and the longer it goes on the more difficult it is likely to become."

The meeting was closed with the report of a number of committees, followed by the election of officers. Officers for the coming year will be:

President, L. G. Tighe, assistant general manager Northern Ohio Power & Light Company, Akron, Ohio.

First Vice-President, F. H. Wilson, president and general manager Cleveland Southwestern Railway & Light Company, Cleveland, Ohio.

Second Vice-President, R. R. Smith, receiver Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.

Secretary-Treasurer, L. E. Earlywine, Central Electric Railway Association, 308 Traction Terminal Building, Indianapolis, Ind.

Henry Bucher, general manager Indiana Service Corporation, Fort Wayne, Ind., was elected to the executive committee to replace C. T. Dehore, president Indianapolis & Southeastern Railroad, Indianapolis, Ind.

The Dodo Became Extinct Because It Ceased Developing*

By L. M. Brown

Vice-President Interstate Public Service Company
President Central Electric Railway Association

SOME people would have us believe that electric railway men are in the same class as the dodo bird. The dodo bird is extinct and today there are those who voice the opinion that we are rapidly approaching extinction and it is only a matter of time until we will be hunting jobs in other lines of business. While it is unquestionably true that the number of electric railways is gradually diminishing, this does not necessarily mean the general breakdown of such transportation as a means of handling urban and interurban traffic. Rather do we see in the gradually diminishing mileage of electric railway lines a possible solution to the difficulties that admittedly beset our path.

Perhaps there is some justification in likening those lines that fail to the once proud and plumed dodo bird. The dodo became extinct because it quit growing and developing with the changing times. Rather than follow the example of the other birds that tried hard to meet new climatic and food conditions, it allowed its feathers to droop and it sulked. The results were just those which might have been foreseen. But the fact that the dodo bird died out had little or no connection with development of other birds which found themselves facing the same conditions. The latter are still doing business and raising large and prosperous families.

The trends in our industry today are twofold. First, there is consolidation into logical, contiguous and larger systems, and second there is a gradual elimination of those lines foredoomed to failure long ago when they were constructed from "nowhere to nowhere" with no stopover privileges. These latter lines had the seed of their failure in their inception, for they were built quite largely in what may be termed a "boom" period, when the idea held sway that any kind of a line would pay if it could only be built.

The process of elimination of these lines is a healthy and normal situation. We do not despair of a tree when we prune its weaker branches, but on the contrary are more optimistic as to its ultimate success. It is thus that we see the gradual elimination of various lines an omen for good rather than otherwise and we take increased courage for the future.

To be successful we dare not stand still. Many of the major units in our territory are definitely committed to a policy of consolidation, admittedly in an effort to place various lines that are now financially unsuccessful upon a successful basis. With unified management and operation backed by adequate finances the public will benefit by improved service.

It is evident that the freight business must contribute an increased proportion of interurban line revenue. For these lines to prosper they must increase this business, and particularly the carload business. To do this successfully will require improved terminal facilities, industrial sidings, elimination of short radius curves, building around some cities and towns, and other improvements in roadway and equipment for faster and more economical operation.

To meet the growing demand for fast, comfortable and convenient passenger service on both city and interurban lines, large sums of money have been and are now being spent to rehabilitate a number of properties in this territory. Modern, light-weight, easily running, noiseless cars for one-man operation, with comfortable seats and attractive appointments, and the speeding up of the service improves the morale of the public and employees and tends to increase the riding habit. In some of the larger cities serious consideration is being given to underground rapid transit or other forms of rapid transit lines on private right-of-way; to the operation of de luxe motor coach service in appropriate territory at possibly higher rates; and to the taking over of taxicab service. Some of these plans are as yet in the experimental stage and it is too early to know just what the final results may mean, but the efforts now being put forth certainly make the outlook for the industry much more encouraging.

Let us not be discouraged by a seeming apathy and lack of appreciation on the part of the public. Service and conveniences are frequently unappreciated until they are lost, or drastic events bring them to the attention of those who use them. The public may, occasionally, find something new in which it will become interested for a time, but experience will, in time, force that same public back to the patronage of a business based upon sound economic principles.

Our task is to adapt the type of transportation we represent to a civilization that is constantly increasing in wealth and in complexity. The opportunity is before us. The public needs and should have modern, efficient electrical transportation. It is within our province to supply that need, and if we do so our efforts will be appropriately rewarded.

**Abstract of an address made at the annual meeting of the Central Electric Railway Association, Cleveland, Ohio, Jan. 23-24.*



Opportunities for Profits in

De Luxe Bus Operation

Survey of urban de luxe bus operations by more than a dozen railways shows that exclusive, higher fare service attracts new riders, principally from the automobile and not gained at the expense of the street car and city-type bus

By

J. R. STAUFFER

Assistant Editor *Electric Railway Journal*

THAT the de luxe bus attracts new riders, produces additional income without a sacrifice on the part of city-type operations and is a type of vehicle capable of gaining favor on routes through many highly restricted residential districts of a city, has been definitely proved by the experience of a number of leading electric railways.

Co-ordination of street car and trolley-fare bus services has progressed steadily during the past decade, with the result that many companies have definitely strengthened their operating and economic structures. However, there is an additional definite field for the de luxe bus and the faster, more exclusive features it affords. This field is not limited exclusively to the development of new sections, but often is to be found along or parallel to existing city routes. Although one of the major values of the de luxe bus is the part it has played in securing franchises through districts where formerly any suggestion of public conveyance met with wholesale opposition, it has been equally well applied to established arteries of mass transportation.

Operating practices in Pittsburgh and Detroit contrast these applications very clearly. In Pittsburgh, six 25-cent fare de luxe coach routes originate in the heart of the downtown business district, extend along improved motor boulevards and serve, on their outbound extremities, the most exclusive residential sections of the city or suburbs. In Detroit, four 10-cent minimum-fare parlor coach lines have been established and successfully operated on four main thoroughfares, served throughout their length by street cars or city-type buses at lower fares. In both cities patronage has been built up from those persons who rarely used the regular service, but were attracted by the new, distinctive vehicles and the advantages of the service they rendered.

"De luxe," the word itself and its application to bus equipment and the type of service rendered, is unquestionably a relative term and any general definition must be the result of past and present practices. Those companies that are utilizing the de luxe bus have almost unanimously had one objective in establishing such service, namely, a form of transportation to bridge the gap between the street car and the higher priced means of

Comparative Study of Fourteen DeLuxe Bus Routes

Company	Line	One Way Mileage	Equipment Used	Territory Served	Other Forms of Transportation in Territory Served	Fare	Fare on Street Car or City-Type Bus	Headways, Minutes		Speed, M.p.h.	Speed of City-Type Service	Standees
								Peak	Base			
Pittsburgh Railways Pittsburgh, Pa.	Wilkinsburg	7.57	Twin Coaches 35 passenger	Business district of Pittsburgh and residential sections	Street car and trains	25c 9 tickets $2.00	3tokens 25c.	4	10	13.80	10.09	Yes
	Highland Park	7.47	Yellow Coaches 19 passenger	Pittsburgh and East Liberty business and residential districts	Street car	25c. 9 tickets $2.00	3tokens 25c.	7	15	14.00	10.28	Yes
	East Liberty	5.12	Yellow Coaches 29 passenger	Pittsburgh and East Liberty business and residential districts	Street car and trains	25c. 9 tickets $2.00	3tokens 25c.	4	7	13.90	10.2	Yes
	Squirrel Hill	5.72	Yellow Coaches 19 passenger	Downtown Pittsburgh and exclusive residential section	Street car	25c. 9 tickets $2.00	3tokens 25c.	5	10	15.60	11.13	Yes
	Mt. Lebanon	6.92	Yellow Coaches 21 passenger	Downtown Pittsburgh and residential districts	Street car	25c. 9 tickets $2.00	3tokens 25c.	5	12	18.00	11 85	Yes
	Bellevue	6.55	Yellow Coaches 19 passenger	Downtown Pittsburgh and residential districts	Street car and trains	25c. 9 tickets $2.00	3tokens 25c.	8	15	17.10	11.22	Yes
Dept. of Street Railways Detroit, Mich.	Grand River	12.18	44 Cadillacs 16 passenger	Business and residential districts	Express street car	10c. minimum (zones)	6c.	1½	3	14.10	11.43	No
	Jefferson	6.80	13 Dodges 15 passenger	Business, industrial and residential districts	Express, street car and city-type bus	10c. minimum (zones)	6c.	4	8	14.82	Exp.street car 14.82 bus 12.60	No
	Mack	9.07	13 Dodges 15 passenger	Business and residential districts	Express, street car and city-type bus	10c. minimum (zones)	6c.	4	10	15.46	11.18	No
	Woodward	8.08	81 Dodges 15 passenger	Business and residential districts	Street car	10c. minimum (zones)	6c.	1	2	14.36	10.39	No
Capital Traction Co. Washington, D. C.	Chevy Chase	8.00	16 Yellow Coaches 29 passenger type converted to 21 passenger capacity	Government administration, business and residential districts	Street car	25c.	6tokens 40c.	3 to 7	20	13.00	9.00	No
Cleveland Railway Cleveland, Ohio	Airport Express	12.85	4 cylinder Whites	Downtown Cleveland through residential district to airport	Street car and city-type bus	15c. to 25c. (zones)	Street car, 7c. Bus 10c.	30	60	17.00	15.00	Yes
	Heights Express	7.92	9 Yellow Coaches 29 passenger	Downtown Cleveland to exclusive Cleveland Heights	Street car and city-type bus	25c.	Street car, 7c. Bus 10c.	5	30	17.00	15.00	No
United Railways & Electric Co. Baltimore, Md.	Roland Park	6.25	7 Whites 25 passenger	Business District of Baltimore and residential sections of Roland Park, Guilford and Homeland	Street car and city type bus	25c.	4tokens 35c.	10	20	13.20	10.40	No

travel such as is afforded by the private automobile or taxicab. It was evident that it would be folly to establish lines of a superior type of service at equal or little higher fares than those being charged on the street car, because any patronage would be gained at the expense of the city type service. A new rider had to be found and the logical place was in that group of people who had previously left the street car for the automobile. It has generally been found that de luxe bus routes equipped with the most modern type of vehicles do appeal to a class willing to pay a higher fare for a service which is fast, comfortable and convenient.

Bus operations in Pittsburgh are unique in contrast with the general practices carried on by the other electric railways throughout the country. There is not one trolley-fare bus in regular use on a system of 592 miles of track. This is due, first, to the general topography of the territory served by the Pittsburgh Railways and, second, to the fact that this whole territory is adequately served by the street car. Consequently when the subject of bus operation presented itself the question of the type of service to be installed had to be considered from three angles: Should buses be substituted for street cars on a number of lines? Should co-ordinated service at trolley fare be established in direct competition with the street car? Should an additional higher fare service be placed on selected routes throughout the city? The latter course seemed the only logical one for the Pittsburgh property, and as a result the Pittsburgh Motor Coach Company now operates six de luxe coach lines at a 25-cent fare. In addition there are four zone routes at 25-cent minimum fare with additional 5-cent zones between Pittsburgh and Charleroi, Pittsburgh and Castle Shannon, Pittsburgh and Oakmont, and a line known as Frankstown Road. There is still a third type of service, namely, two routes at 10-cent minimum fare with 5-cent additional zones. These routes extend between Charleroi and California and Charleroi and Donora, Pa.

A careful analysis of the cost of travel in Pittsburgh was made. It was found that one could travel on the street car for approximately ½ cent per mile, could drive his privately owned automobile for about 10 cents per mile, or could use

A second article showing the use of the de luxe bus in interurban and interstate service will appear in a later issue.

the taxicab at approximately 20 cents per mile. It became evident that any means of transportation costing the rider about 3 cents a mile should be profitable, principally because the riders would not come from those who patronize the street car, and for 3 cents a mile a service of quality could be rendered to appeal to the rider who had left the street car previously for the automobile. A charge of 25 cents was made and has proved satisfactory for the lines established. Most of the riding on the Pittsburgh lines is one way, although on the new Wilkinsburg route there is now some two-way business. Nearly all passengers are carried for a greater part of the run. There is no short-haul traffic.

The Pittsburgh Railways began its operation with the larger type of bus, having seating capacities of from 29 to 35 passengers. Experience, however, on routes such as it operates with almost entirely one-way traffic has shown that the smaller type of bus is more satisfactory for this kind of work, and the company's new purchases are of the 21-passenger seating capacity.



In Pittsburgh de luxe bus terminals are centrally located in downtown business districts

Detroit Operation Unique in Extensive Use of Smaller Buses

Unlike Pittsburgh, Detroit found its field for de luxe bus operation on four main thoroughfares served throughout their length with street cars and city type buses. Also operating on these routes were hundreds of jitneys carrying on an enormous business in competition with the railway's services. The small type bus was selected to replace jitneys principally because they created an impression of a more individual service than the larger equipment and because shorter headways could be run with fewer empty seats.

The four routes operated on Grand River, Jefferson, Mack and Woodward Avenues now use 161 buses of 15- and 16-passenger capacity of the Dodge and Cadillac manufacture. On the Grand River Line 44 16-passenger eight-cylinder Cadillacs are used to provide selective local service in co-ordination with an express street car route on this avenue. The fare on this line ranges from 10 cents to 30 cents, in 5-cent increments. The fare on the street car is 6 cents. The headways range from 1½ minutes in the peak hours with a base table of three minutes in the non-rush hours.

Likewise on Jefferson Avenue the de luxe bus operation has competition by express street car, local city-type bus and competitive bus service. The fares on this line range from 10 cents to 20 cents in 5-cent increments, while the street car and local bus charge 6 cents and the competitive bus 10 cents. This line serves the downtown section of Detroit as well as industrial and residential sections on Jefferson Avenue.

Woodward Avenue, one of the most heavily traveled thoroughfares in Detroit, is served by the Woodward Parlor Coach Line and a street car line. On this line eighty-one 15-passenger Dodges are used and run on one- and two-minute headways throughout the day. Short headways are also maintained by the street cars and yet at times there is apparently not enough service to accommodate the traffic on this avenue. From a revenue standpoint the de luxe bus operation on Woodward Avenue is the most successful. The Mack Avenue Coach Line operates parallel to the Jefferson coach route part of the way, then it turns north into residential districts. This



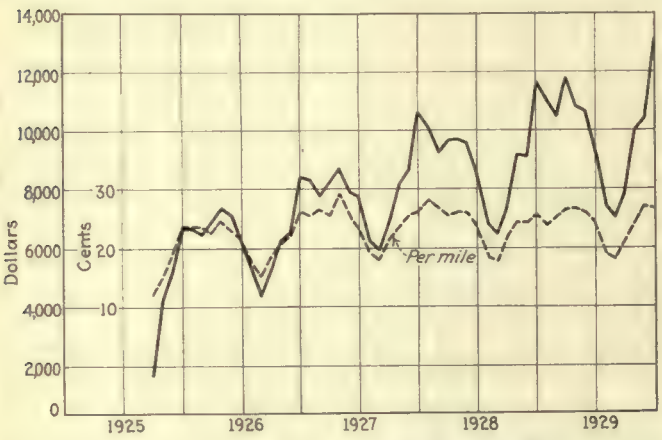
De luxe buses give selective service on four main arteries in Detroit



Unusual seating arrangement and smoking compartment feature the Chevy Chase buses

line operates thirteen 15-passenger Dodges at a fare of 10 cents to 25 cents in 5-cent increments. Headways of four minutes in the rush hours and ten minutes in the non-rush hours are scheduled.

The Capital Traction Company Washington D. C., operates three lines with de luxe bus equipment. The original one, the Chevy Chase coach line, was started in September, 1925, and operates from the downtown business section of Washington past the Union Station and Capitol to the outlying district of Chevy Chase. The second line is a sightseeing line purely and operates from the Treasury Building in the center of the city, past the Lincoln Memorial and through Potomac Park. Its operation is not comparable with the others except that the rate of fare and type of equipment used are the same. This line operates only during the summer months and caters principally to tourists. The third line, known as the Cleveland Park Parlor Car Line, was started in November, 1927, but as it did not prove profitable was abandoned on Sept. 30, 1929, with the exception of one trip in each direction in the morning and afternoon rush hours.



Gross revenue has been increasing steadily on the Chevey Chase Line. Revenue per mile has remained constant

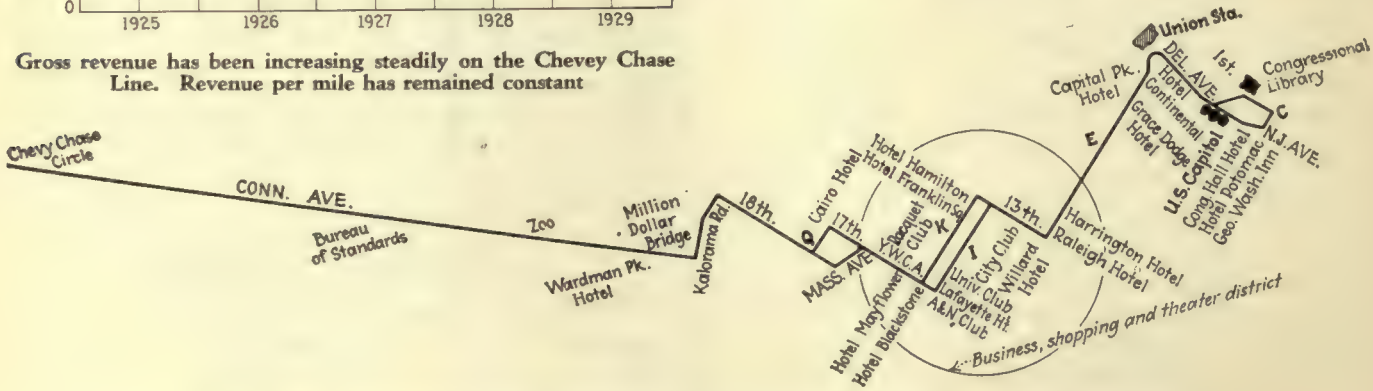
The Chevy Chase Coach Line has been a most successful operation since its beginning. It started operating with four buses on a headway of twenty minutes all day. Traffic has increased continually so that now sixteen coaches are used to run headways of three, four and five minutes in the morning and five, seven and ten minutes in the evening rush hours. An interesting chart showing the gross revenue and revenue per mile of this line, since its beginning, accompanies this survey. This increase in patronage has not been built up at the expense of the street car or city-type bus, but has come from new riders who prefer to leave their automobiles at home and use the high type of service that this line affords. The Chevy Chase Line parallels the street car line along its whole length outside of the city proper, and furnishes service which can be obtained on street cars throughout its length.

A distinctive feature of this line is the unusual seating arrangement of the bus. Twenty-nine-passenger Yellow Coach chassis are used, but individual seats are so placed that only 21 passengers are carried. From an economic standpoint this practice has been questioned, but those in charge of the Chevy Chase Coach Line feel sure that to a great extent this individual seating of their passengers without crowding has been the cause of its success. Another feature is the smoking compartment in the rear, partitioned off from the front of the bus by glass panels.

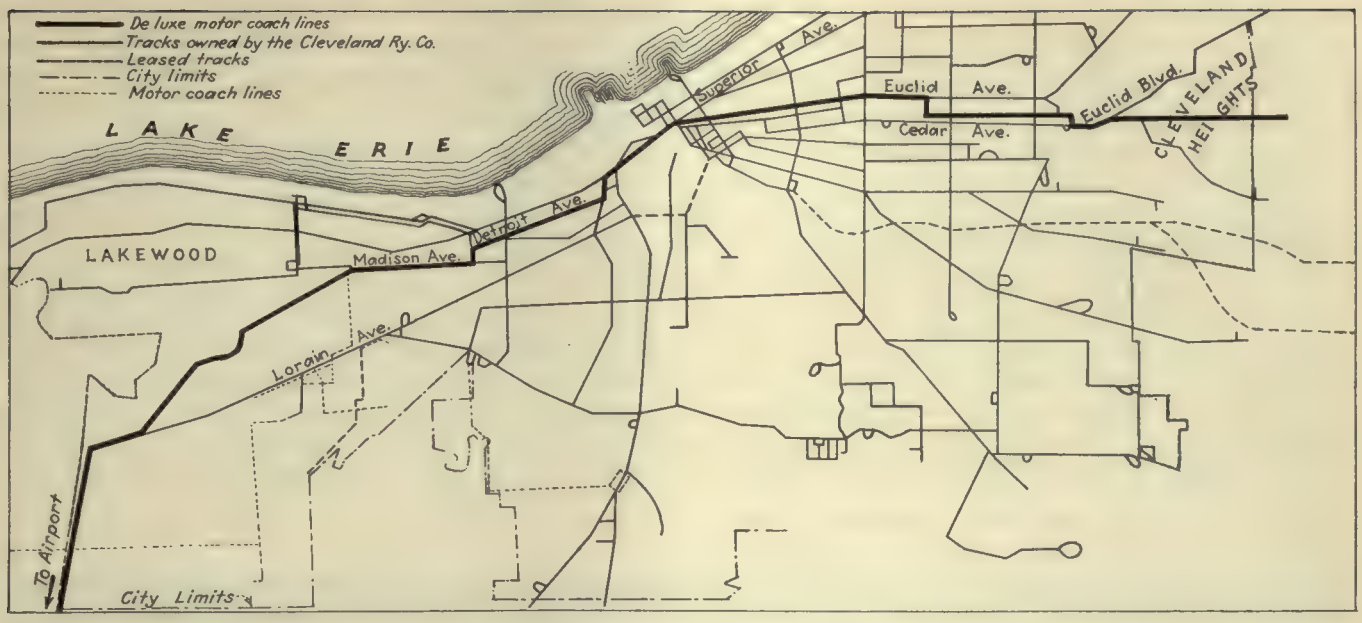
Cleveland Railway Operates Two Lines

Two express de luxe bus routes are operated by the Cleveland Railways in the territory which it serves. The first is known as the Airport Express; the second, the Heights Express. The latter line was only put in operation on Dec. 7, 1929, and is in every sense a full de luxe service between downtown Cleveland and the very highly restricted residential section of Cleveland Heights. The fare on this line is 25 cents. No transfers are given or accepted. Its installation just before the Christmas rush period had distinct advantages, in that a number of people used the line in preference to taking their automobiles into the Christmas traffic jams, became familiar with the type of service and are continuing to use it.

The line carried 380 customers the first day. This increased regularly until it now has over 800 fares a day. At the beginning a fifteen-minute service was provided during the rush hours. It was found necessary to give a ten-minute service during the rush hours on



The Chevy Chase Coach Line in Washington, D. C., serves all phases of the Capital's activities



Cleveland Railway operates two de luxe routes

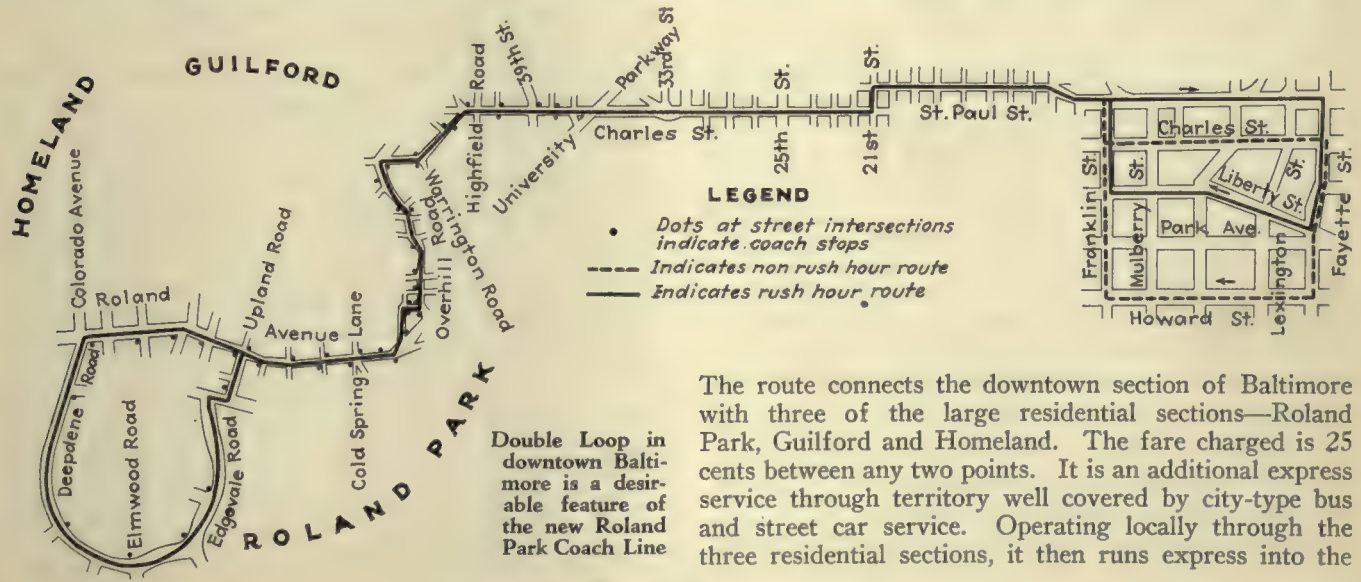
account of the heavy patronage. During the other hours of the day the service operates on a half-hour schedule. From Dec. 7 to Dec. 31, inclusive, the coaches operated 12,850 miles, carried 15,039 passengers and took in $3,859, earning approximately 30 cents a mile. The cost of operating is figured at about 27 cents a mile.

The situation with regard to the Airport Express line is particularly interesting. The route is 12.56 miles in length and runs from the Cleveland Airport to East 22nd Street and Euclid Avenue, operating as an express route through the greater part of the territory. The Berea Bus Line Company operates from Berea, Ohio, to the Public Square over the same route. This interurban line has been in operation for the past six or eight years and has during all that time been doing an interurban business as well as picking up passengers from all points along its route in the city to the Public Square. While this is contrary to the provision of the Collister-Kreuger act of Ohio, it has been permitted by the Cleveland City Council because the Cleveland Railway was not giving adequate service on the same streets.

By resolution of the Cleveland City Council, the Cleveland Railway started operation of the Airport express route on Aug. 23, 1929. During the air races of the National Aeronautical Association this route paid very well, as many as 100 coaches per day being used. However, after the races business immediately dropped off because of the duplicated service provided by the Berea Bus Line and the Cleveland Railway.

The Cleveland Railway route is too long for the rate of fare charged at the present time, namely 15 cents for the first 10 miles, 20 cents for the next zone of 1 mile, and 25 cents within the second zone of 1½ miles. This route is being continued at the request of the City Council, although the Cleveland Railway has requested permission to abandon it. If the Berea Bus Line were required to rely on the income derived from its interurban operation it would undoubtedly lose money, but the combination makes it a paying proposition. In other words, interurban service alone is a losing proposition, express service on a line of this length is a losing proposition, but the combination of the two results in a profitable operation.

In September, 1929, the United Railways & Electric Company, Baltimore, Md., began operation of its first de luxe bus line known as the Roland Park Coach Line.



Double Loop in downtown Baltimore is a desirable feature of the new Roland Park Coach Line

The route connects the downtown section of Baltimore with three of the large residential sections—Roland Park, Guilford and Homeland. The fare charged is 25 cents between any two points. It is an additional express service through territory well covered by city-type bus and street car service. Operating locally through the three residential sections, it then runs express into the

center of the city. Up to the present time the line has operated only on weekdays, there being insufficient traffic on Sundays and holidays to justify running the buses.

Before establishing this line a very complete survey of the situation was made in conjunction with the Roland Park Company and various civic committees. Letters were mailed to residences throughout the district asking their opinions on the proposed line. The replies were encouraging and the service was started with a complete schedule calculated to produce a patronage that would build up to the capacity of the coaches instead of with a skeleton service that would grow only as increased patronage demanded. The railway company believed that this would familiarize the users of the bus with its full advantages at once, and would achieve the results of having more people change their riding habits. A very unusual feature in the layout of this route consists of a double loop in the downtown section of Baltimore. The loop used in the rush hour is shorter and includes most of the financial and business section of the city, while in the non-rush hour the loop is enlarged to include the better shopping districts.



High class equipment has attracted growing patronage in Baltimore

Other Companies Use De Luxe Bus Equipment

The Boston Elevated Railway operates one 25-cent fare de luxe bus route on Beacon Street and through the business section of the city. The line serves territory which also has car service. Patrons have the privilege of free transfers from the de luxe buses to other service and transfer from other service to de luxe buses upon payment of 15 cents additional fare. The carfares in the territory served by the de luxe line are 6¼ cents for a local ride and 10 cents with full transfer privilege. The scheduled speed of the de luxe service is 12.3 m.p.h. as compared with 11.1 m.p.h. average for all other bus lines. Stopping places are not arranged for express service on this route. Buses stop to take on or let off passengers at any point. However, the equivalent of express service is operated because practically all of the patrons of the de luxe line reside in the territory served by the outer sections of the line.

The Duluth-Superior Coach Company, a subsidiary of the Duluth Street Railway, besides operating six feeder routes to the street railway lines, also operates one de luxe bus service between the business centers of Duluth and Superior. This route furnishes additional service between these two points, as there are street car lines serving the same territory. The type of service is different from the city type of bus service in that Yellow Coach de luxe buses are used on this line, while White, Mack and Reo city-type buses are used on the feeder lines. The fare is 25 cents on the de luxe buses and 7½ to 25 cents on the feeder lines. The speed of this line is approximately 15 m.p.h. as compared to 11 m.p.h. on the street cars.

The Cincinnati Street Railway, Cincinnati, Ohio, on Nov. 21 began operation of a new bus route between the business district of Cincinnati and a new, recently built up high-class subdivision 6 miles from downtown. Four new Mack buses with special 25-passenger bodies are being used. The fare charged is 25 cents. The coaches operate on a 30-minute headway from 7:30 in the morning until 8 p.m., when they go on an hourly headway until midnight.

The lines and type of service so far mentioned have been strictly selective higher fare lines operated for the purpose of appealing to a new type of rider in a community served by city-type operations of both street cars and buses. Quite distinctive from this type of service is another use for the de luxe bus on certain selected city lines. A number of companies are providing the local public on many of their lines with de luxe motor coaches, not as supplementary service at higher rates of fare. The United Electric Railway, Providence, R. I., operates 69 Twin Coaches and 40 of the latest model six-cylinder Whites on lines operating at regular rates of fare, most of which supplanted street cars. Quite a few of these lines are routed and operated as express service, benefiting the residents of outlying districts near Providence. With this equipment they also operate several special routes, two of which are only operated in the summer months to provide supplementary service between Providence and Crescent Park, and Pawtucket and Crescent Park. Crescent Park is a summer shore resort. Excellent results have been secured, particularly on the latter where the earnings have been very high. Two other special routes between Pawtucket and Pawtuxet, and between Olneyville and Pawtuxet are operated on Wednesday and Saturday nights to serve a very fine public ballroom in Pawtuxet. Twin Coaches are used on these lines, which take a more direct route than the trolley car and operates express all the way.

Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Key System Transit Co., Oakland, Cal.					
November, 1929.....	598,437				*45,726*
November, 1928.....	588,865				*86,505*
12 mo. end. Nov., 1929	6,502,428				*888,631*
12 mo. end. Nov., 1928	6,606,184				*623,846*
Market Street Railway, San Francisco, Cal.					
December, 1929.....	817,254	676,519*a*		140,735	83,481*g*
December, 1928.....	811,968	719,642*a*		92,326	31,982*g*
12 mo. end. Dec., 1929	9,590,194	8,041,926*a*		1,548,268	837,513*g*
12 mo. end. Dec., 1928	9,754,461	8,327.688*a*		1,426,773	677,755*g*
Denver Tramway, Denver, Colo.					
12 mo. end. Dec., 1929	4,214,297	2,902,564	494,201	864,420	351,137
12 mo. end. Dec., 1928					460,960
Jacksonville Traction Co., Jacksonville, Fla.					
November, 1929.....	92,574	74,447	7,787	9,877	
November, 1928.....	98,840	81,044	9,004	8,261	
12 mo. end. Nov., 1929	1,143,880	936,375	106,590	94,740	*62,691*
12 mo. end. Nov., 1928	1,210,294	976,864	109,743	117,213	*47,604*
Honolulu Rapid Transit Co., Honolulu, T. H.					
December, 1929.....	88,284	52,125	7,888	28,199	17,869
December, 1928.....	93,890	53,100	13,231	28,653	22,947
12 mo. end. Dec., 1929	1,052,273	608,420	105,832	350,927	213,720
12 mo. end. Dec., 1928	1,076,433	630,341	147,277	312,153	220,077
Chicago Surface Lines, Chicago, Ill.					
December, 1929.....	5,272,651	4,074,317*a*		1,198,334	909,743*h*
December, 1928.....	5,334,219	4,188,165*a*		1,146,053	879,486*h*
Boston Elevated Railway, Boston, Mass.					
November, 1929.....	2,877,280	1,982,281	138,018	761,223	64,148
November, 1928.....	2,927,910	2,081,326	145,099	705,169	2,583
Eastern Massachusetts Street Railway, Boston, Mass.					
November, 1929.....	663,198	436,562	19,805	232,687	86,076
November, 1928.....	703,317	488,821	27,646	206,191	56,170
11 mo. end. Nov., 1929	7,817,586	4,947,492	338,222	2,750,358	870,240
11 mo. end. Nov., 1928	8,202,869	5,342,139	324,680	2,758,475	864,630
Eastern Massachusetts Street Railway, Boston, Mass.					
December, 1929.....	761,868	495,262	12,959	264,902	130,462
December, 1928.....	802,888	548,257	40,079	234,488	128,158
12 mo. end. Dec., 1929	8,579,454	5,442,755	351,182	3,015,261	1,000,703
12 mo. end. Dec., 1928	9,005,758	5,890,396	364,759	2,992,963	992,789
Boston, Worcester & New York Street Railway, Framingham, Mass.					
November, 1929.....	59,262	50,057	1,625	8,209	6,739
November, 1929.....	677,842	550,012	18,148	121,966	105,796
Department of Street Railways, Detroit, Mich.					
December, 1929.....	2,078,954	1,773,879	65,457	248,354	104,434
December, 1928.....	2,154,288	1,699,402	62,529	401,039	246,310
12 mo. end. Dec., 1929	26,444,874	21,057,542	750,948	4,754,779	3,103,189
12 mo. end. Dec., 1928	24,668,175	19,283,497	783,012	4,847,251	2,932,355
Twin City Rapid Transit Co., Minneapolis, Minn.					
12 mo. end. Dec., 1929	13,487,976	11,132,357*a*		2,477,596	1,255,878
12 mo. end. Dec., 1928	13,005,353	11,049,401*a*		2,055,233	833,589
Kansas City Public Service Co., Kansas City, Mo.					
November, 1929.....	746,136	553,785	41,675	130,674	55,820
11 mo. end. Nov., 1929	8,180,254	6,201,134	458,425	1,520,694	670,150
Kansas City Public Service Co., Kansas City, Mo.					
12 mo. end. Dec., 1929	8,951,616	7,327,003*a*		1,624,613	698,223
Lincoln Traction Co., Lincoln, Neb.					
11 mo. end. Nov., 1929	434,267	380,204*a*		54,063	10,179
11 mo. end. Nov., 1928	438,532	354,905*a*		83,627	
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
November, 1929.....	83,615	62,168	4,300	22,985	*8,198*
November, 1928.....	82,028	60,341	5,775	19,043	*12,554*
11 mo. end. Nov., 1929	930,295	695,675	79,160	271,229	*77,872*
11 mo. end. Nov., 1928	946,385	681,579	82,110	274,690	*74,860*
Brooklyn-Manhattan Transit Corporation, New York, N. Y.					
December, 1929.....	5,199,104	3,400,231	303,977	1,565,568	798,552
December, 1928.....	4,135,153	2,567,829	269,935	1,376,947	673,910
6 mo. end. Dec., 1929.	30,409,954	20,422,091	1,900,208	8,508,960	3,851,131
6 mo. end. Dec., 1928	24,135,352	15,710,731	1,652,835	7,263,345	3,106,142
Brooklyn & Queens Transit Corporation, New York, N. Y.					
December, 1929.....	2,002,528	1,545,106	117,519	361,349	236,588
December, 1928.....	2,031,999	1,667,806	106,633	280,122	152,553
6 mo. end. Dec., 1929.	11,935,555	9,419,520	682,989	1,961,747	1,212,144
6 mo. end. Dec., 1928.	12,108,324	10,041,706	644,349	1,552,522	778,965
Hudson & Manhattan R.R., New York, N. Y.					
December, 1929.....	1,112,472	507,424*a*		605,047	272,289
December, 1928.....	1,101,309	551,173*a*		550,136	218,098
12 mo. end. Dec., 1929	12,517,756	6,248,096*a*		6,269,659	2,247,210
12 mo. end. Dec., 1928	12,388,927	6,425,643*a*		5,963,283	1,941,056
Interborough Rapid Transit Co., New York, N. Y.					
December, 1929.....	6,511,920	3,833,653	201,184	2,477,082	*198,880*
6 mo. end. Dec., 1929	35,749,805	22,495,993	1,202,433	12,051,378	*989,179*
Long Island Railroad, New York, N. Y.					
November, 1929.....	3,084,453	2,460,962	186,121	436,511	240,568*f*
November, 1928.....	3,194,283	2,299,200	167,515	718,208	528,431*f*
11 mo. end. Nov., 1929	38,215,910	25,323,733	2,844,996	10,029,170	8,227,214*f*
11 mo. end. Nov., 1928	37,404,155	26,027,072	2,560,579	8,797,994	7,119,845*f*
New York, Westchester & Boston Ry., New York, N. Y.					
November, 1929.....	202,381	142,855	23,476	36,804	*180,499*
November, 1928.....	199,677	141,673	20,238	38,167	*169,751*
11 mo. end. Nov., 1929	2,312,657	1,427,875	249,380	647,804	*1,724,685*
11 mo. end. Nov., 1928	2,185,487	1,469,160	219,725	507,977	*1,724,237*
Staten Island Rapid Transit Co., New York, N. Y.					
November, 1929.....	216,406	147,545	15,000	53,861	54,954*f*
November, 1928.....	259,344	160,942	10,641	88,402	49,192*f*
11 mo. end. Nov., 1929	2,441,623	1,801,677	191,800	448,129	383,289*f*
11 mo. end. Nov., 1928	2,885,228	1,938,564	207,850	737,956	326,935*f*
Third Avenue Railway, New York, N. Y.					
November, 1929.....	1,256,076	969,639	81,656	224,548	*40,059d*
November, 1928.....	1,278,000	983,039	85,920	233,686	*19,045d*
5 mo. end. Nov., 1929.	6,392,582	4,928,417	443,823	1,123,354	*179,835d*
5 mo. end. Nov., 1928.	6,475,397	4,985,680	466,277	1,118,046	*133,992d*
Third Avenue Railway, New York, N. Y.					
December, 1929.....	1,729,135	1,527,285		201,850	*30,368d*
December, 1928.....	1,315,791	1,102,341		213,450	*21,319d*
6 mo. end. Dec., 1929.	7,671,717	6,447,525		1,224,192	*210,204d*
6 mo. end. Dec., 1928.	7,791,188	6,554,300		1,236,888	*155,311d*
Philadelphia & Western Railway, Norristown, Pa.					
December, 1929.....	80,311	48,624*j*			31,687
December, 1928.....	80,883	50,148*j*			30,735
December, 1929.....	804,968	631,889*j*			173,079
December, 1928.....	843,489	659,934*j*			183,555
Philadelphia & West Chester Traction Co., Upper Darby, Pa.					
11 mo. end. Nov., 1929	1,120,128				
11 mo. end. Nov., 1928	1,178,547				
United Electric Railways, Providence, R. I.					
November, 1929.....	592,761	475,434	29,244	88,083	37,163
November, 1928.....	603,645	481,599	35,376	86,670	38,591
11 mo. end. Nov., 1929	6,636,790	5,330,436	353,544	952,809	392,020
11 mo. end. Nov., 1928	6,837,595	5,473,112	355,807	1,008,676	433,759
Texas Electric Railway, Dallas, Texas					
November, 1929.....	168,197	146,035*a*		22,162	
November, 1928.....	176,306	141,546*a*		34,760	
11 mo. end. Nov., 1929	1,706,494	1,515,751*a*		190,743	
11 mo. end. Nov., 1928	1,646,095	1,453,234*a*		192,861	
Galveston-Houston Electric Co., Houston, Texas					
November, 1929.....	42,237	24,029	2,714	15,492	
November, 1928.....	49,171	26,294	2,931	19,944	
12 mo. end. Nov., 1929	592,018	332,258	31,205	228,748	*41,254*
12 mo. end. Nov., 1928	649,540	376,764	31,743	241,033	*28,472*
Houston Electric Co., Houston, Texas					
November, 1929.....	274,652	169,539	10,742	94,371	
November, 1928.....	280,016	171,629	21,484	86,912	
12 mo. end. Nov., 1929	3,378,970	2,093,987	284,469	1,009,179	609,606
12 mo. end. Nov., 1928	3,328,886	2,039,678	294,799	994,408	583,867
Pacific Northwest Traction Co., Seattle, Wash.					
November, 1929.....	81,198	60,556	2,896	17,744	
November, 1928.....	69,317	62,373	4,043	2,899	
12 mo. end. Nov., 1929	949,477	731,715	55,324	162,435	45,945
12 mo. end. Nov., 1928	884,529	735,453	51,193	97,881	*63,051*
Calgary Municipal Railway, Calgary, Alta.					
11 mo. end. Nov., 1929	937,348	565,473		371,875	38,954
11 mo. end. Nov., 1928					53,322
Edmonton Radial Railway, Edmonton, Alta.					
November, 1929.....	72,647	45,842		23,348*e*	1,956
November, 1928.....	59,656	44,492		21,743*e*	3,418
11 mo. end. Nov., 1929	763,602	494,664		260,158*e*	9,528
11 mo. end. Nov., 1928	726,278	485,301		242,173*e*	802
Lethbridge Municipal Railway, Lethbridge, Alta.					
10 mo. end. Oct., 1929.	50,298	41,175		9,123	*16,731*
10 mo. end. Oct., 1928.					*22,606*
British Columbia Electric Railway, Vancouver, B. C.					
November, 1929.....	1,270,922	697,209		573,713	
November, 1928.....	1,192,080	614,212		577,868	
5 mo. end. Nov., 1929.	5,995,951	3,315,156		2,680,795	
5 mo. end. Nov., 1928.	5,622,233	3,067,509		2,554,724	
Regina Municipal Railway, Regina, Sask.					
11 mo. end. Nov., 1929	383,437	234,931		128,506	18,778
11 mo. end. Nov., 1928					218

Italic figures indicate deficit. *a* Includes taxes. *b* Net operating revenue. *c* Before taxes. *d* After adjustment bond interest. *e* Includes depreciation. *f* Net after rents. *g* Before depreciation and federal tax. *h* After joint account expenses, federal taxes, and city's 55 per cent. *j* Includes interest and taxes.

Letters to

Two-Color or Three-Color Signals

New York, N. Y., Jan. 1, 1930.

To the Editor:

In a recent report issued by the National Committee for Municipal Traffic Ordinances and Regulations, certain proposed standards for the regulation of vehicular traffic were recommended. The more important of these deal with the proposal to employ three-color light signals at locations where a two-color signal might suffice. Since definite positions contrary to these recommendations have been taken by traffic officials of at least two major cities, New York and Los Angeles, the decision seems at least open to question.

It is important to note that this recommendation is predicated upon a tabulation of replies to questionnaires sent by the national committee to some 200 municipalities where traffic control signals are now in operation. The purchases and installation of the traffic control systems in these 200 municipalities as a rule have not been by the official department directing traffic, usually the police department, but in general by the Aldermanic Council or Town Trustees. Ordinarily neither of these two bodies includes traffic control engineers, nor is it versed in the art of traffic control signaling. The bidders proposing to supply traffic control apparatus, with the exception of one or two manufacturers who had undertaken to furnish traffic control signal units as a side line, were persons politically affiliated and in a favorable position to secure a contract. After receiving the award these persons generally established a temporary factory wherein were assembled the signal housings or such other apparatus as could not be purchased in the open market. Obviously these manufacturers preferred to sell three-color light signals upon which the profit was comparatively large.

From the foregoing it may be inferred that, in adopting a tabulation of the replies received in the questionnaires, the national committee has based its recommendation on apparatus supplied by certain manufacturers not making a specialty of producing traffic control signal apparatus, as distinguished from a recommendation based on protracted tests made by competent traffic control engineers to determine the superiority of one or the other signal system.

Politics a Factor in Signal Equipment

Unfortunately, owing to the political onus usually associated with awarding such contracts most of the established and largest manufacturers of signaling systems, who have had long experience in that field, have held aloof from street traffic control. One major city has had the local public service corporation finance, install and maintain the traffic control system at a service charge of $55 per signal unit per year, thereby relieving the city of all major responsibility. Obviously the position of the national committee precludes making such a recommendation.

With reference to the indications for governing existing traffic, the conditions under which vehicular traffic operates may be classified as follows:

1. Congested traffic lanes: for example, the hub arteries of a major city where traffic ordinarily is so dense that comparatively slow movement occurs.

2. Major traffic lanes: these include the more important arteries extending from the congested areas to the outlying districts and adjacent towns, on which vehicles may travel in groups at comparatively high speed.

3. Maladroit intersections: those other than simple right-angled intersections, blind streets, etc.

Four General Types of Control

For the above three conditions of traffic the following systems of signaling may be adopted:

1. Synchronous, where all vehicles traveling in parallel directions proceed for a fixed interval of time, alternately with all remaining stationary for a similar, or differing, period of time.

2. Progressive, where successive blocks show the same signal indication in conformance to the speed-distance factor determined by the rate at which traffic may pass through. Such ideal conditions of block length are rarely found. In this system the driver of a vehicle will always find a green signal at the approach to an intersection providing he has traveled at the prescribed speed. Obviously no yellow signal is required.

3. Speed-distance or co-ordinated, based on the speed-distance factor of each block traversed, long or short. In such a system the driver will always find a green signal as he approaches the intersection, provided he travels at the prescribed speed. This system permits group movement of vehicles. Obviously such a system is ideal and does not require the yellow light.

4. Special control, more generally applied to maladroit intersections, and dealing with conditions too complex to discuss here. With the exception of manual control they can usually be covered by systems 1 or 3.

Let me refer now to the application of systems 1 to 4 to the conditions (a), (b) and (c), previously named.

Condition (a): Congested traffic lanes comprising the hub area of the major cities. The traffic is ordinarily so dense that high-speed group movement of vehicles cannot be obtained. Obviously the more simple two-color (green and red) synchronized system will suffice, being not only more economical and simple to install but more simple to operate and less costly to maintain. Owing to the comparatively low speed the moving vehicles can be stopped within a few feet and no yellow signal is required.

Condition (b): Major traffic lanes extending from congested districts to outlying districts and adjoining towns. As these lanes not only permit a higher speed, but also group movement to obtain maximum capacity, obviously the co-ordinated system should be installed. If the vehicle driver proceeds at the proper speed he will always find a green signal at the approaching intersection. It is therefore obvious that no yellow signal indication is required.

From the foregoing it will be apparent that a maximum flow of traffic may be effected by the use of two-color signal indications only, and that the ideal systems for obtaining maximum traffic do not require a third indication. Furthermore, investigations where the yellow signal is employed indicated that the motorist will speed

the Editor

up his car on yellow in an attempt to beat the red signal which he knows is coming. This appears to be universal at non-policed intersections.

It is also important to note that in the standards adopted by the Railway Signal Association, which have been in effect for many years, the yellow signal, when employed, indicates proceed, prepared to stop at the next signal. Obviously, the meaning established by the Railway Signal Association standard is very different from that conveyed by the recommendations of the national committee, and confusion of standards will occur.

It is also rather unfortunate that the names of one or more of the traffic control engineers, who have had from 30 to 50 years experience with steam railroads, do not appear on the roster of the national committee.

O. A. Ross, C. E.

Railway Crossing Signals Should Be Distinctive

NACHOD & UNITED STATES SIGNAL CO., INC.
LOUISVILLE, KY., Jan. 8, 1930.

To the Editor:

As manufacturers of highway crossing signals for electric railways, we have noted a certain trend which we think merits discussion. One cannot fail to mark how implicitly the traffic signal indications are obeyed by automobilists; and, on the contrary, unfortunately, anyone can recall how many times at a highway crossing signals indicating the approach of a train have been wantonly disregarded by motorists. What more natural than that the railways, solicitous to have their crossing signals obeyed, should set up at their crossings with highways indications that look like or imitate traffic signals, showing green normally to the street, and red when there is a train approaching? We ourselves have sold a number of such highway crossing signals, when so specified by the purchaser, and we note that certain steam roads are installing such indications at their highway crossings.

We think this is essentially wrong, since a traffic signal is a "stop and stay" signal, the indications being periodically reversed; while the highway crossing signal, for which a distinctive indication has been specified by the Signal Division of the A.R.A., is a cautionary signal in the nature of a "stop and proceed" signal. The autoist when confronted with a crossing signal in operation should stop and wait a reasonable time; and then, if no train appears, should drive close enough to the crossing to see for himself, before he crosses. It is manifestly impossible to control a highway crossing signal so that it will always mean that a train will pass the crossing in so many seconds; for the train may be stopping within the warning zone, or it may be shifting over the tracks but not approaching the crossing. This means that the automobilist will be indefinitely held up, or he must violate a signal which he has been taught to consider as a "stop and stay" signal.

Moreover the railroad, by exhibiting a normal green at the crossing, which is the most unrestricted clear indication possible, invites the autoist to cross on the strength of that indication alone without stopping and without looking. If a normal indication is wanted, yellow, which is cautionary, at least imposes care in crossing. The writer is of the opinion that the traffic signal indications of alternating red and green, with or without the intermediate yellow, should be reserved for traffic signals, and flashing lights or wigwag signals reserved for railroad crossings.

CARL P. NACHOD.
President and Chief Engineer.

Extensive Paving Work Done by San Francisco Municipal Railway

CITY AND COUNTY OF SAN FRANCISCO
DEPARTMENT OF PUBLIC WORKS, MUNICIPAL RAILWAY

Dec. 21, 1929.

To the Editor:

Your survey of paving practices of the railways of the United States, as contained in an article appearing in the ELECTRIC RAILWAY JOURNAL on page 1108 of the December, 1929, issue, has been read by me with considerable interest. Your readers might infer from this article, however, that the Municipal Railway of San Francisco is relieved of all paving charges which the private companies are subject to. For your information, the following statement of the paving charges of the Municipal Railway for the last three years is detailed:

Fiscal Year			
1926--1927	Maintenance	$18,209.69	
	New construction	1,907.60	
	Replacements	25,578.81	
	Total		$45,696.10
1927—1928	Maintenance	$19,555.45	
	New construction	8.00	
	Replacements	6,797.99	
	Total		26,361.44
1928—1929	Maintenance	$16,667.11	
	New construction	102,461.48	
	Replacements	9,560.61	
	Total		128,689.74
	Total July 1, 1926 to June 30, 1929		$200,746.20

From the above statement it will be seen that over $200,000 was expended by the Municipal Railway in the last three years for paving, of which nearly one-half was for maintenance and replacements. Considering that the Municipal Railway has approximately 80 miles of single track of railroad to maintain, it will be readily seen that sufficient expenditure has been made to keep the paving in first-class order.

The general impression given to the public by the reading of articles in various railway and other publications is that the Municipal Railway of San Francisco has considerable work performed for it by the city of San Francisco for which no charges are made. This is an entirely erroneous conclusion, as the Municipal Railway pays the city of San Francisco for all work performed for it.

F. BOEKEN,
Superintendent.



International steel Twin Ties spaced 6 ft. center to center were laid on a 3-in. layer of broken stone





Seven-inch grooved girder rail was used with rolled-steel joint plates seam welded



Track was brought to correct line and grade by machine tamping

Building Concrete Track with Minimum Interruption of Service



Mixing apparatus mounted on railway trucks was used for grouting

After track in Boston had been brought to line and grade with dry broken stone ballast, voids were filled with cement grout, using a vibrating machine to assure complete penetration

USE of a novel method of construction recently enabled the Boston Elevated Railway to renew its tracks on Huntington Avenue with a minimum interruption of service. Instead of using mixed concrete as is the usual practice, which requires that the track be supported to line and grade by blocking, bracing, etc., this track was brought to line and grade with dry broken stone ballast and the voids filled with cement grout, a vibrating machine being used to assure proper penetration.

In the design of this track structure the total depth is 12 in. At the bottom is a 3-in. layer of broken stone. Good quality, clean, 2-in. trap rock was used for this purpose. International steel Twin Ties spaced 6 ft. center to center were laid on the broken stone. The rail used was 7-in. grooved girder, with rolled steel joint plates, carbon arc seam welded. Another layer of broken stone was then placed, making the total depth 9 in. to the subgrade. Next, the ballast was thoroughly tamped and the track brought to correct line and grade.

After this had been done grout was poured into the voids. For this purpose a mixture of one part cement, two parts fine bank sand, and water was used. The bank sand was considered to be preferable to sea sand on account of the presence of a large amount of shell in the latter. Sufficient water was used to make the grout flow easily and penetrate to the bottom of the broken stone.

Penetration was aided by the use of a vibrator. The duration of vibration considered necessary to give complete penetration was four minutes. Tests made by the Massachusetts Institute of Technology of the concrete produced by this method showed that it was strong and of good quality. A 3-in. layer of sheet asphalt was laid on the concrete to constitute the paving surface.

This method of construction is similar in certain respects to that of the Hassam pavement which was at one time widely used in the vicinity of Boston and elsewhere. It is believed by H. M. Steward, superintendent of maintenance, to possess an important advantage in that it permits the use of the track by cars at a much earlier period than is possible where mixed concrete is used. In fact it is believed that cars can safely



Penetration of the grout was assured by use of a revolving vibrator placed longitudinally between the rails

operate over such track as soon as it has been brought to line and grade and during the time the grout is setting.

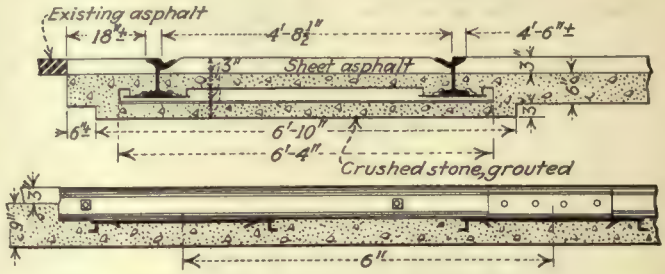
Interesting evidence of the strength of this design was furnished by an accident which occurred a short time after the completion of the Huntington Avenue job.

Weight Test Proves Solidity of Structure

On the night of Dec. 14, a 30-in. high-pressure water main, located about 9 ft. below the surface of the street, burst, and before the water could be turned off a hole approximately 30 ft. long and 25 ft. wide at the top, and about 9 ft. deep, resulted. All of the earth under the in-bound track for a distance of about 30 ft. was removed and the excavation extended across the out-bound track as well for a length of approximately 20 ft.

During the period of excitement, a Boston Consolidated Gas truck, weighing about 5,000 lb., passed over the street which was undermined and fell into the excavation head first. The Boston Elevated wrecking truck was called and in order to take the gas company's truck out of the hole it was necessary for the wrecking truck to stand on the track which was undermined as described above. The weight of the Boston Elevated wrecking truck is about 12,800 lb. and it was estimated that it lifted one-half the weight of the gas company's truck, or 2,500 lb., so that the total weight on the unsupported track was 15,300 lb.

The tracks were damaged very little as a result of the water break and the removal of the gas company's truck. The in-bound track, being unsupported for a distance of 30 ft., sagged of its own weight slightly. The out-bound track, however, remained to proper surface.



Sectional views of concrete track in Boston built by placing broken stone and grouting the voids

The pavement in the space between the two tracks was broken through in order to facilitate the placing of shoring to support the tracks and to allow the city departments to make the necessary repairs. Has this not been necessary, the concrete and asphalt pavement would have remained intact for the entire track area—that is, the tracks, the dummy and the brows.

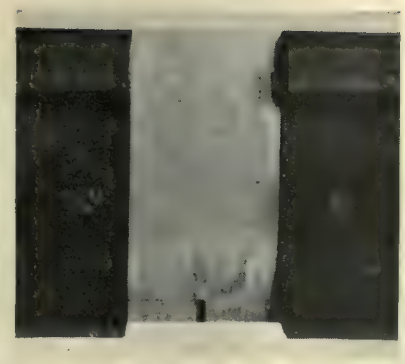
When the repairs to the underground structures were made, car service was resumed on both tracks, these tracks being supported by shoring. No further repairs to the tracks were necessary except to replace the pavement. The excavation caused by the water has been filled in, but the shoring supporting the tracks was allowed to remain in place, as the final settlement of the fill will not take place for a considerable period. This occurrence furnished an interesting demonstration of the solidity of a structure of this design.



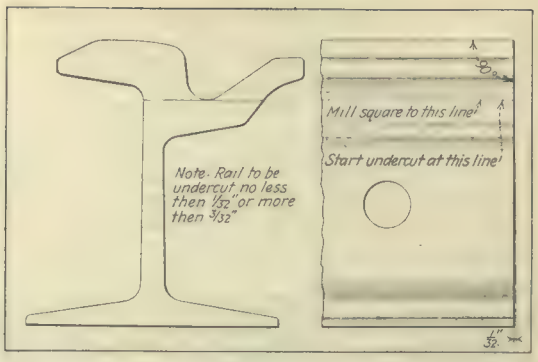
The paving surface consists of a 3-in. layer of sheet asphalt



The standard practice of undercutting rails from head to foot permits a gap to appear as the rail wears which gradually causes cupping



By milling the heads square after the standard undercut is made, there can be no gap and the danger of cupping is minimized



The practice adopted by the Cleveland Railway is to mill the rail head square and undercut from the base of the rail head to the foot of the rail. This is giving very satisfactory results

Double-Milling Rail Heads to Prevent Cupping at Joints

By Howard H. George
Superintendent of Way Cleveland Railway

PROBABLY no part of the track structure has given more trouble than the joint, and it has been the subject of a large amount of study and investigation. The goal toward which railway engineers have been striving has been a joint which would have a life equal to the rail without cupping, but the number which produce such results has been rather small as compared with the total number installed. Assuming that splice bars are of a suitable design, that an adequate seam weld has been provided and that the mechanical assembly of the joint has been properly made, there is only one factor left, which is generally responsible for past failures. That is the flowing of the rail steel into the small gap between the rail ends which soon causes the head of the remaining rail to cup.

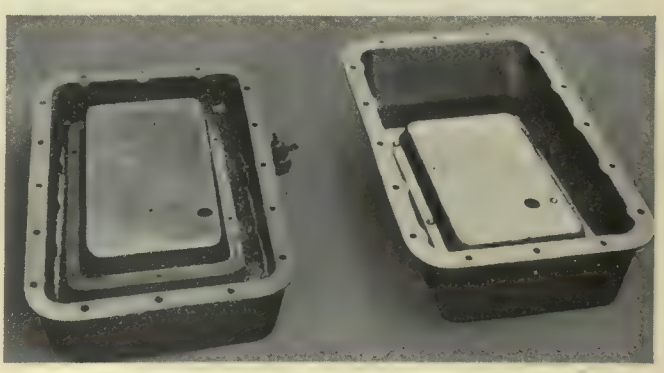
For a number of years it was the general practice to specify rail ends to be milled square. In practice, however, it was found that it was impossible to mill these rails exactly square and that sometimes the rail bases of the abutting rail ends made contact before the heads. This, of course, made it impossible to close the gap. To overcome this difficulty the specifications were revised to provide for undercutting all rail ends from head to base, thus insuring initial head to head contact when the joint was first assembled. This has been the practice for several years and is the method now generally followed. Since the rails are undercut for their entire depth, however, as the head wears down there develops an opening between the ends of the rails. As the gap widens, metal from the head of the sending rail flows down into the opening, allowing the car wheel to strike a blow on the receiving rail, the result being the relatively early appearance of rail cupping.

Electric railway engineers have long sought to eliminate, or at least minimize this trouble, resort frequently being had to the use of shims. During the present year, the writer arranged with one of the rail manufacturers to experiment with the double-milling of rail ends as developed in the way committee of the American Electric Railway Engineering Association about four years ago and later patented by E. M. T. Ryder, way engineer of the Third Avenue Railway. The method followed is shown on the accompanying sketch. The rails were first undercut in accordance with existing standard practice and then the heads were milled square. Each rail was carefully checked at the milling machine by the machine operator and also by the inspector.

Accompanying photographs show clearly the difference in the results obtained, as between the standard undercutting and the square milling of the heads. These joints were made up in the usual way by drifting the rail ends together with 1⅛-in. diameter drift pins, reaming the holes and bolting up with 1⅛-in. diameter heat-treated bolts. The joints were then seam-welded, using the hand feed method of welding with extra low carbon welding rods. The splice bars have a carbon content between 0.2 and 0.3. They were then machined through, as shown, to expose the conditions in the center of the joint. The practically perfect contact of rail ends throughout the entire depth of the head as well as the perfect contact along the fishing surfaces are felt to constitute ample justification for the additional expenditure of 75 cents per ton involved in the extra milling operation.

Deep Crankcase Pans Prove Advantageous

INCREASING by 2 in. the depth of bus crankcase pans has proved advantageous for the International Railway of Buffalo, N. Y. The oil capacity is increased approximately 77 per cent. This increase in possible oil storage has served to eliminate the mid-day follow-up of buses for the purpose of adding oil to motor crankcases. Buses are getting approximately 28 miles to a quart of oil. Old crankcases held 9 qt. of oil, while the new and deeper crankcase pan holds 16 qt. of oil.



Deeper crankcase eliminates the necessity of replenishing oil supply of the bus at mid-day

One-Man Long Level*

By R. B. Evans
Assistant Superintendent of Construction
Cleveland Railway

IN CHECKING the level of the subgrade and the stone track foundation it is often necessary to use a level board longer than ordinary. To facilitate this work, the Cleveland Railway has designed a long level board which can be handled by one man. This board is



Long level board, designed by the Cleveland Railway to be handled by one man

10 ft. long, 1½ in. wide and 4 in. high in the center, tapering to 2½ in. on either end. A strip of sheet metal is fastened to the bottom side to preserve its wearing surface. At the free end of the board is placed a level glass where it is easily seen by the operator. At the same end there is also a graduated metal gaging rod, which can be set to any distance desired, being held in position with a setscrew.

Pavement Straight Edge*

By P. H. Costello
Paving Inspector Cleveland Railway

GREATLY improved pavement surface and increased production per man have resulted from the use of a "pavement straight edge" made in the Cleveland Railway shops. This new device has also made it unnecessary for a workman to follow the pavers to raise or lower inaccurately placed stones. Past experience on the Cleveland Railway indicated that, when laying granite block pavement in the track area, the paver did not always lay the block to a uniform surface. Use of the new "pavement straight edge" has corrected this.

The device consists of a piece of soft wood 5 ft. 6 in. long, 2 in. wide and 3 in. high, well seasoned, and planed on the bottom side, to which is fastened a metal strip to preserve its wearing surface. On top is a hand grip to facilitate handling by the paver.



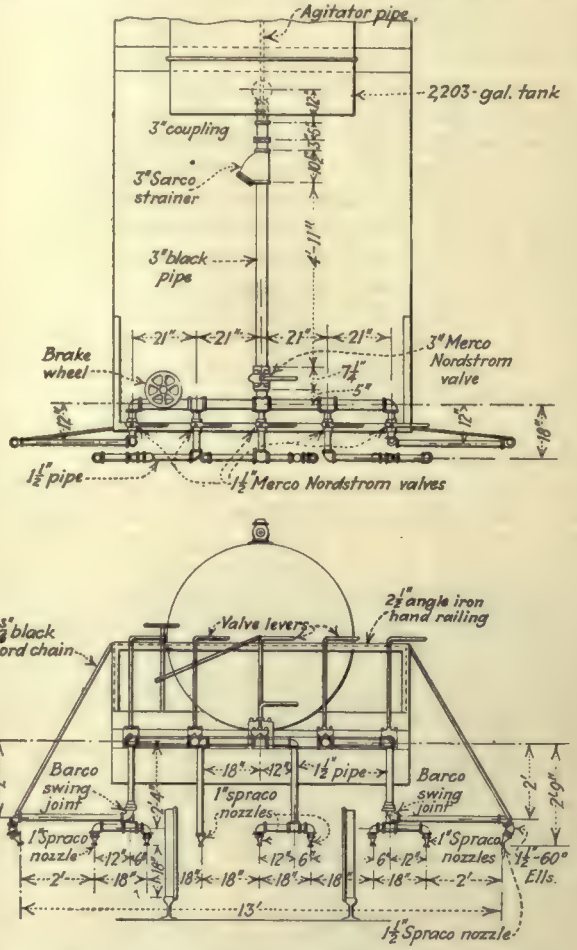
When paving with granite blocks the Cleveland Railway uses straight edges to insure level surface

**Submitted in* Electric Railway Journal *Prize Contest.*

Spray Equipment Effective for Weed Killing*

By A. G. Pirkle
Georgia Power Company, Atlanta, Ga.

FOR removing weeds from between tracks the Georgia Power Company has designed a spray equipment for distributing a weed-killing chemical. This apparatus is erected on a flat car and connected by pipes to a tank carrying the solution. The spray equipment is moved



Weed killing is carried on by means of spray equipment designed by the Georgia Power Company

over the roadbed by a sand car, which is equipped with an air compressor. Compressed air is brought by means of a hose to the tank containing the solution, which is then forced out through nozzles at the desired pressure. The chemical used is non-poisonous and is shipped in a concentrated form which must be diluted by taking 4 gal. of water and 1 gal. of the concentrate. After the solution is made it is agitated about ten minutes by applying

a pressure of 30 lb. of air through a perforated pipe running the full length of the tank, the top of which is left open. At a working pressure of 30 lb. per sq.in., each of seven small nozzles sprays 8½ gal. per minute and each of two large nozzles sprays 24 gal. Thus the total capacity is 107½ gal. per minute. This requires an air compressor which has a capacity of at least 60 cu.ft. of air per minute.

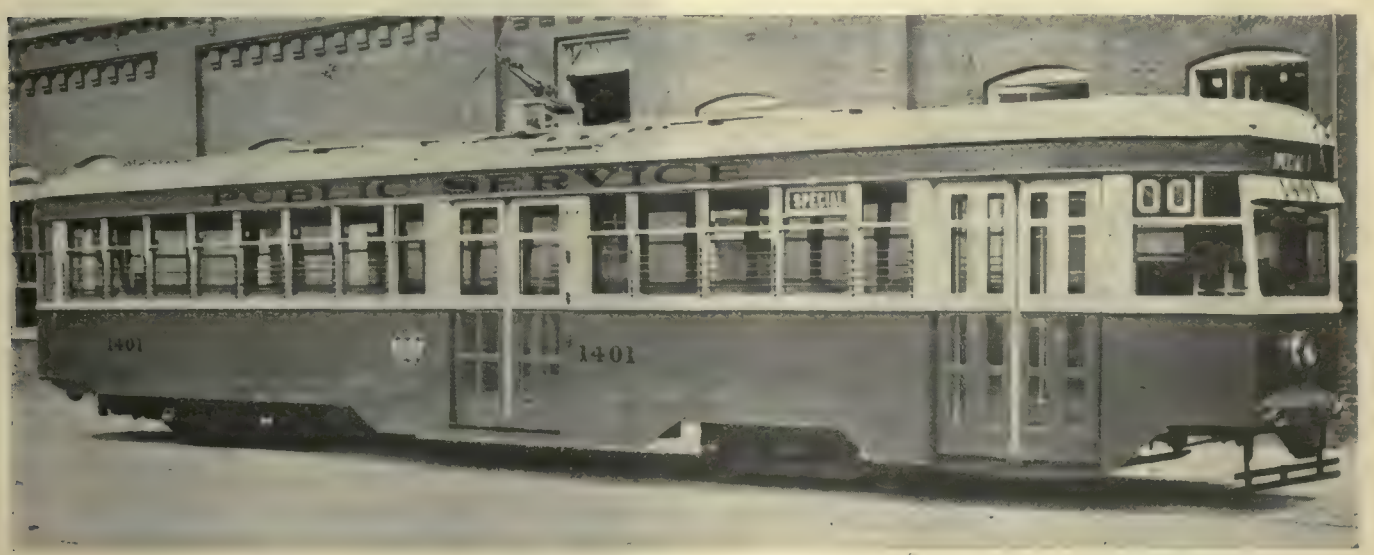
Manufacturer's specifications call for 472 gal. of diluted solution per mile. To discharge that amount, a speed of about 40 m.p.h. is required. While operating, the car is run as near to that speed as can be estimated by the motorman. The spray nozzles are controlled by individual valves, which makes it possible to apply the chemical only where vegetation exists. When all nozzles are open, the width of the spray is about 15 ft. This method is more economical than the old method of hand weeding. In three days all weeds were killed in a track area of more than 20 miles of single track, thus making it possible to have a clean roadbed during the entire growing season. Concentrated chemical totaling 1,473 gal. was used, which at 38 cents per gallon cost $567.92. Labor cost for the three days was $92.94, five men being employed where four could have done the job. The total cost was $660.86 for 20.08 miles of single track, or $32.91 per mile.

Distinctive Features in Sample Car

Built by St. Louis Public Service Company

IN THE past two or three years a number of experimental and sample cars have been constructed by the electric railways and manufacturers. All of these have embodied new ideas in their design and have contributed to the development of the modern car to suit present-day needs. The latest car to make its appearance is a sample car recently completed for the St. Louis Public Service Company, St. Louis, Mo. Like the others, the St. Louis car has in addition to certain features tried in other cars a number of new ones. Among its interesting features are automatic pedal control, resembling in the arrangement of the pedals that of an automobile, a switch to hold the controller in full series position, a pedal for preventing emergency braking when the hand is released from the dead-man control, a control panel for the buttons and levers operating the gong, sand, doors, emergency braking and heaters, a stanchion arrangement in the front which makes fare collection for the one-man operator easier, extensive use of aluminum throughout the car, equal mounting of equipment underneath the car, a reverser control mounted in a pedestal at the rear, a motor-operated fare box and an attractive appearance, both exterior and interior. As the car includes those elements of design which the company feels are desirable for standard service on its system, the company plans to use it as a sample when ordering new equipment as needed.

Westinghouse electro-pneumatic control, actuated with line current, is installed in the car. It is the VA variable automatic type, switch-operated. The master control, operated by a pedal, is mounted in a cabinet recessed in the floor. The air brakes, of General Electric design, also are pedal-operated, with a self-lapping valve. The arrangement of the two pedals differs from previous installations in that the pedal for acceleration is on the right and the pedal for braking on the left. This change was made to make the operation of the car more nearly like that of an automobile, and hence more natural for most motormen. Both pedals are depressed with the right foot, so that in both braking and accelerating the action for the right foot is the same as in starting and stopping an automobile. In starting, the brake pedal is released and the accelerator pedal on the right depressed; in stopping the procedure is simply reversed. Of course with no gears to shift and no clutch pedal to operate the left foot remains idle.



A pleasing appearance was obtained by a low roof, a 5-in. skirt below the side sill and streamline painting

Unit switches for the control are mounted in a cabinet at the rear of the motorman, another departure from usual practice. This cabinet extends out from the side of the car making a partition between the motorman's compartment and the remainder of the car. Action of the various control switches is obtained through an air-operated sequence drum. Another innovation is a series control switch which stops the advance of the control when full series position is reached. This is



Front half of the car showing the arrangement of stanchions and the type of seats used

particularly useful for switching and operating at slow speeds through congested downtown districts.

Immediately in front of the operator's seat and over the two pedals is a control panel on which are mounted a brake-locking switch, controls for both the front entrance and center exit doors, a dead-man control button, a handhold, and buttons for operating a gong, releasing sand and controlling a heater circuit.

New Type of Deadman Control

If the motorman wishes to leave his position at the front of the car he may do so by locking the brakes with a device on the control panel. The dead-man control button is located at a convenient position for the left hand. In a corresponding position on the right is a handhold of the same size and shape for the operator's right hand. If the operator wishes to remove his hand from the dead-man control button he may prevent an emergency braking by depressing a pedal near the floor. The heater circuit is controlled by two buttons so that the heater current can be utilized for throwing track switches. These buttons have absolute control regardless of the thermostat standing.

In addition to the regular reverser at the front of the car there is a second, located in the center of the semi-circular rear end. A Westinghouse drum control switch and a General Electric brake valve are mounted in the enclosed pedestal. To operate the reverser, the cover is simply released and slid up a stanchion to a resting position. An automatic gong in the base of the pedestal is a further help for the operator in backing up his car.

Entrance is gained to the car through double outward-folding doors at the front. By locating stanchions in the front vestibule as shown in an accompanying illustration, it is possible for a large number to board the car, yet all must pass by the fare box in single file. This allows quick loading and positive collection from every passenger. Two half-seats on the left side at the front allow free passage for the passengers after leaving the fare box. The circulating load principle is employed, the passengers leaving by treadle-operated sliding doors in the center. Fare collection is made with a Johnson fare box, operated with an air motor. It is lighted by a lamp in a specially constructed reflector box with louvre construction, which allows good lighting of the fare box but prevents the light from glowing at the operator or boarding passengers.

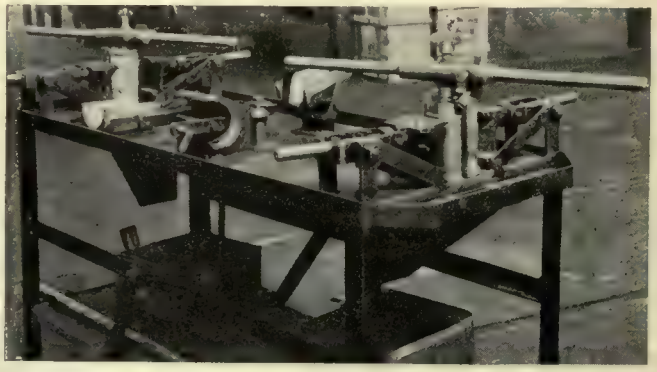
Aluminum was used for practically the entire body. Body bolsters, stanchions, conduits for wiring, posts, letterboard and carlins (one at each post) are all of this metal. Aluminum was used also for all of the ceiling except the circular ends which are of Agasote. Almost all air brake and door control piping is of copper with brass fittings. Air compressors and reservoirs were located under the rear of the car to give a more even distribution of weight between the front and rear trucks. The car has a total weight of 36,180 lb., divided 19,380 lb. for the body, 10,800 lb. for the trucks and 6,000 lb. for the motors.

Careful attention was given to obtaining a pleasing appearance, both exterior and interior. With a narrow letterboard, low roof, streamline painting and a skirt, obtained by extending the side plate 5 in. below the side sill, a racy appearance was obtained. A wide single-piece window, equipped with two vertical-acting window wipers, a dash-lighting headlight and a sun visor, gives a distinctive air to the front. The car exterior is finished in orange and cream, trimmed in red. Its roof is gray and the window guards and lettering are black.

With 26 cross-seats, three single seats and provision for seven passengers in a circular seat at the rear, the car has a total seating capacity of 62.

Repair of Interchangeable Bearings*

By Max Feigenspan
Mechanic Hamburg Elevated Railway
Hamburg, Germany



Portable bench for reaming and finishing relined bearings in the Hamburg Elevated Railway shops

FINISHING bearings which have just received a new lining is greatly simplified by the use of a specially constructed portable bench in the shops of the Hamburg Elevated Railway. The bench is provided with four vises, each of which holds the bearing in a different position. This facilitates the finishing of its surface on all sides. After reaming has been completed the bearing can be placed in the center vise in a nearly horizontal position and further finished by hand if this is desirable. Bearings are held in place by adjustable claws.

**Submitted in* Electric Railway Journal *Prize Contest.*

Causes of Wheel Failure Studied at Havana

By Otto Gottschalk
Engineer Car Equipment Department
Havana Electric Railway

RECENTLY it came to our attention in Havana that none of our cast-iron chilled car wheels were being removed because of wear on the tread, but rather because of low flanges due to chipping. This called forth an investigation which brought us to the conclusion that the chipping was due to a combination of two conditions: first, flange-bearing switches, mates and frogs; second, method of molding and chilling the wheel.

The Havana Electric Railway operates 600 single-truck cars, all equipped with cast-iron chilled wheels of 30-in. diameter, 2½-in. tread and ⅝-in. flange. In the city the track consists of grooved running rails with numerous sharp curves, switches and crossovers. The crossovers, switches and mates are of the flange-bearing type. Outside the city the track system consists of tee rails, non-flange-bearing switches, frogs and crossovers. Storage tracks in yards are of the same construction.

Our records showed that over a period of six years the average life of wheels was 36,000 miles. This low figure was due to the precautions taken to prevent derailments in operating cars on the tee rail. Wheels with low and chipped flanges were removed for fear of derailment on the tee rail while they could have been operated safely over the grooved rail in the city of Havana.

Various explanations were offered for this chipping. It was suggested that wheels were not properly installed on the axles. Sharp curves, improper alignment of track, rough spots due to rail welding, etc., were also suggested as possible sources of trouble. Probably all of these contributed to some extent. However, we found one of the chief difficulties to be that the bead of metal left on the top of the flange of non-chilled back flanges broke or chipped little by little when passing through crossovers or frogs and more so when passing through switches and mates. The chipping was found to be a detail process up to a certain point; then larger pieces of metal broke off, resulting in a condition that might cause a derailment in operation over tee rail.

To test our theory we placed a number of wheels in service with non-chilled back flanges that had this bead of metal ground off, taking care during the grinding to prevent undue heating which would soften the chill. The average mileage obtained from these wheels was 42,000 miles.

Manufacturers have now developed the chilled-back flange wheel, claiming for it that the change in grain of the metal increases the average mileage per wheel. We believe this to be true, although the change in the grain is not the principal cause. It is rather that the extension of the chill blocks when molding causes the slight bead of metal formerly left on the top of the flange to be left on the outside, so that the contour of the flange at the point of contact with the flange-bearing switches, mates and crossovers is left in a perfect condition, almost as if it had been turned in a lathe.

Despite this improvement we have continued to experience a certain amount of trouble from chipped flanges, and we have come to the conclusion that it is not fair to expect even a perfect flange of a cast-iron chilled wheel, with its brittle metal, to support a car and its passenger load when passing through and over flange-bearing switches, mates and crossovers, though the period of such strain is only of momentary duration. The tread of the wheel was designed to carry the load. Men were not intended to walk on their toes. How long could men do this stunt without a breakdown?

If cast-iron wheels give a greater return on the investment than steel wheels, then we must eliminate the flange-bearing switches, mates and crossovers.



Single-truck cars and sharp curves are typical of electric railway operation in Havana

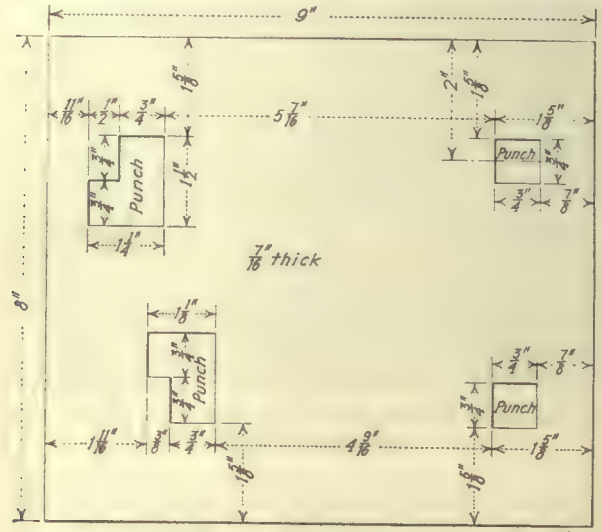
Flexible Rail Joint Tried at Providence

EXPERIMENTS are being made by the United Electric Railways of Providence, R. I., to determine whether or not advantages can be obtained by the use of a welded rail joint differing in principle from those commonly used. The design of this joint, known as the Moisselle joint, provides a round bar which is welded to the rail heads and which has a U-shaped bend opposite the rail ends, making the joint flexible rather than rigid. About a year and a half ago, 175 of these joints were installed on various rail sections including 9-in. girder, 8-in. high T, and 66-lb., 70-lb. and 75-lb. T rail. An inspection a year later showed a few partial failures which were attributed to the use of weld bars which were too small and to defective welding. The record of these joints was considered by H. W. Sanborn, chief engineer, to be good enough, however, to warrant a trial of 50 additional rail joints of the same type. Larger bars were used in the later installation. The features of the joint which particularly appealed to the management were its ease of installation, the absence of necessity for any mechanical fit in the fishing section and the flexibility due to the bend in the bar which is thought to eliminate the blow on the receiving rail and also to provide for expansion and contraction.

Combination Tie Plate for Various Rails*

By W. S. Yeats
Georgia Power Company, Atlanta, Ga.

TO OBTAIN the full life of a creosoted tie it is necessary to protect it from mechanical injury. If rails start to cut in, decay will follow and ties must be removed sooner than if they had been protected. To prevent this type of wear the Georgia Power Company uses tie plates in various sizes to fit the different rail widths which are found on the property. The tie plate used by the company has simplified the problems of the track foreman because it fits the bases of rail of 4½ in. to 6 in. width by ½ in. intervals. Either two or three spikes per plate may be used, and the form of the hole is such that the spikes are backed up by the plate. This tie plate has been used by the Georgia Power Company since 1923, during which time it has been entirely satisfactory.



This tie plate used by the Georgia Power Company fits any rail base from 4½ in. to 6 in.

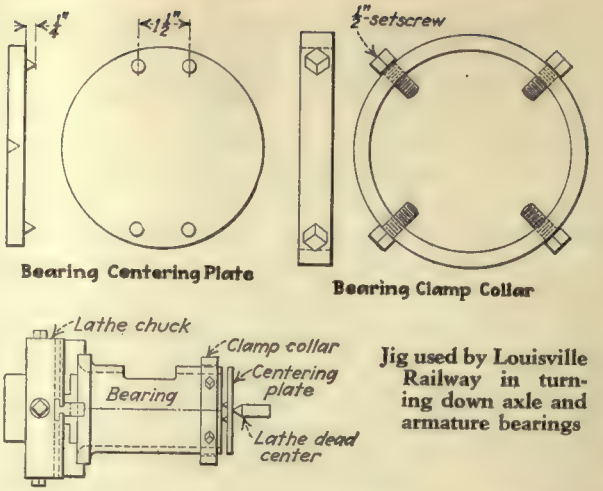
Axle and Armature Bearing Jig*

By Herbert Senior
Foreman Louisville Railway

FOR turning axle and armature bearings a special jig is used in the shops of the Louisville Railway. This consists of a bearing centering plate and a bearing clamp collar. When starting the operation it is necessary to face the bearing at the split surface, after which the bearing clamp collar is put on to hold the bearing halves together. When this is finished, the bearing is chucked and the tailstock is screwed against the center plate to force the four center pins in the bearing, as shown in the accompanying drawing.

When these operations have been performed the bearing clamp collar is released and is moved back over the tailstock. The bearing is then ready for turning with only one setting of the tool.

All reclaimed bearings are welded on the two halves, after which they are spread over a mandrel $\frac{1}{32}$ in. larger than standard size and then finished in the jig described. After the bearings have been turned on the outside to the required dimension, the outside of the collar and the inside of the bearing are finished to the required size.



Jig used by Louisville Railway in turning down axle and armature bearings

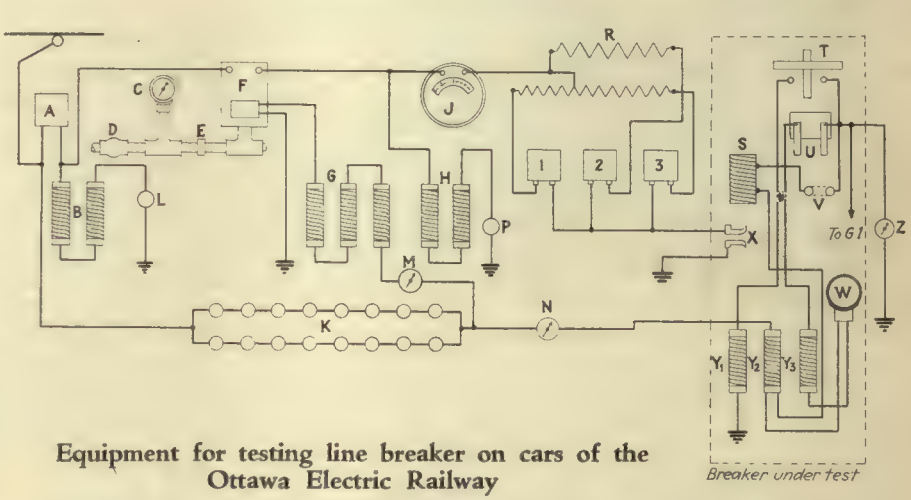
Testing Circuit Breakers in Place*

By R. W. James
*Electrical Department Ottawa Electric Railway
Ottawa, Canada*

IT HAS been found advantageous on the cars of the Ottawa Electric Railway to set the line switches and circuit breakers at definite points and then to seal them so that they cannot be tampered with, either by car operators or carhouse employees, without the knowledge of the line switch repairman.

To test and calibrate the line switches in place on the car, a testing set has been developed by the electrical department. This is installed in one of the pits in the

**Submitted in* Electric Railway Journal *Prize Contest.*



Equipment for testing line breaker on cars of the Ottawa Electric Railway

A—Mechanical circuit breaker;
B—Resistance, 1440 ohms;
C—Air pressure gage;
D—Air valve;
E—Air pipe insulator;
F—Unit switch, type 806-J-7;
G—Resistance, 2160 ohms;
H—Resistance, 1440 ohms;
J—Ammeter;
K—Lamp resistance;
L—Red lamp, 50 volts;
M—Control switch, 10 amp.;
N—Control switch, 10 amp.;
P—Red lamp, 50 volts;
Q—Connection to G-1 in controller;
R—Grid resistor; Type 801-E-4 switch to be set
S—Operating coil;
T—Interlock;
U—Overload fingers;
V—Carbon contacts;
W—Holding coil;
X—Contact tips;
Y1, Y2, Y3—Resistances, 720 ohms each.
Z—Control switch, 10 amp.

repair shop. The car on which the breaker has to be tested is run on the pit track and the breaker is connected into the test circuit by means of short leads. Connections of the testing set are shown in the diagram. *A* is a mechanical circuit breaker and *F* a line switch of the 806-J-7 air-operated unit switch type. The rheostat *R*, which consists of two sets of grids, 63 small and 63 large, can be connected in various combinations by the canopy switches 1, 2 and 3, the corresponding currents being indicated on the ammeter *J*. The switch to be tested, which is of the Westinghouse 801-E-4 type, is connected into the circuit as indicated. The magnet valve of switch *F* is energized by current passing through two sets, when switch *M* is closed, each of seven 85-volt lamps in series, shown at *A* in the diagram. The operating coil *S* of the line switch under test is energized through the same set of lamps by closing switch *N*. When the line switch is under test the short-circulating bar across the carbon contacts *V* is removed, the current goes through holding coil *W*, resistance *Y*3, and the left-hand overload finger *U*. It then follows across the short-circuiting bar to the corresponding overload finger and then to ground through the *G-1* connection. This allows a test corresponding to the first notch of the controller. On all other notches, holding coil *W* is not needed, because the control circuit is open when there is an overload and cannot be closed again until the controller is put back to the first notch, which permits the current to go to ground through *G-1*.

To test a switch breaker, switch *A* is first closed and air at approximately 70 lb. admitted through valve *D*. The desired combination of resistances is made by closing switches 1, 2 or 3. Control switch *M* is then closed, in turn closing switch *F*. Control *N* can then be closed, actuating the switch under test. To test a switch with the holding coil on the first notch, control switch *Z* is closed, after which it may be opened for testing on two or more speeds.

In this manner a switch can be tested on the car under road conditions. In addition to testing and setting line switches, this set is also useful in detecting various forms of trouble which otherwise would be difficult to locate.

New Products for the Railways' Use

Improved Headlight Resistance

GREATER efficiency of the individual units and easier maintenance are advantages claimed for a new headlight resistance recently placed on the market by the Ohio Brass Company. The units are of the exposed wire type instead of having covered wire, thus



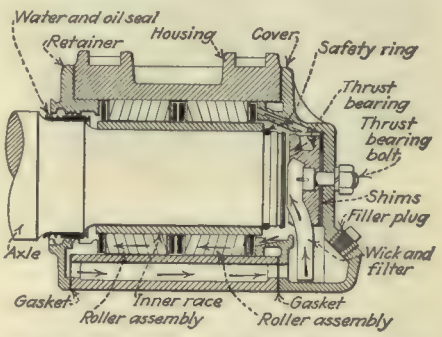
Removable unit headlight resistance is adjustable for voltage variation

permitting a much higher operating temperature. The wire is of nickel-chromium composition which eliminates rust, corrosion or brittleness brought about through long use. The tubes supporting the wires are threaded to eliminate possible shorting of a part of the coil. These tubes are arranged side by side to afford maximum opportunity for heat radiation. Ventilation is aided by two baffles mounted on top of the resistance, forming a duct for air circulation.

In order to make up for possible variations in line voltage, a sliding shunt is attached to two adjacent tubes by which the desired amount of current is delivered to the lamp. There are no exposed operating parts in the new resistance, and the cover may be readily removed without danger of losing the holding ratchets, which are securely fastened to the base. In place of the "pig tails" that were formerly used as connections, the new units are joined with brass strips which have completely overcome sagging and the resultant danger of grounded contacts.

Novel Lubricating System for Roller Bearings

SIMPLICITY of construction marks the new Fafnir-Melcher roller bearing for railway journals. A sleeve comprising the inner race, a roller assembly, and an outer housing in which the roller path is integral, are the three main parts. The sleeve, being shrunk or pressed on the axle, furnishes a hard and wear-resisting surface for the operation of the rollers. Alignment and flexibility are provided for in the design of the box. The rollers need take only radial load as all lateral thrust is absorbed by bronze thrust bearings, which, due to efficient lubrication, have a life equal to any other part of the bearing. The housing or box itself is composed of three parts: the front cover, containing the oil seal grooves and dust guard; the center member, in which is embodied the roller path equalizer seat and the pedestal flanges, and the oil reservoir.



Lubrication system of Fafnir-Melcher bearing—from well through wick to journal, to roller path and back to reservoir

A special alloy is used for this center member, and the roller path is heat-treated and ground to a minimum tolerance, thus assuring accurate fits, concentricity, and a wearing surface equal to or better than that of the separate outer race type. An advantage of this construction is the greater wall thickness permitted, which naturally increases the strength of the box, but still remains within A.E.R.A. standard pedestal dimensions.

The assembly consists of two sets

of flexible rollers each contained in a spacer bar cage. The separator bars between each of the rollers permit better lubrication, as well as positive alignment of the individual rollers at all times. A feature of the bearing is the circulating and filtering lubricating system, which provides a constant circulation or flow of from 15 to 30 drops of filtered oil per minute through the bearing. The important element is a wick which draws oil from the reservoir to the axle, from whence by centrifugal action it is carried to the roller path, through the rollers and back to the well again.

Demountable Wheel for Rail Cars

WITH the new Fairmont demountable wheel for rail cars, it is possible, instead of discarding the whole wheel when a tire wears out, simply to remove eight $\frac{5}{8}$-in. nuts and press on a steel wheel blank or tire, which is bolted to the hub and remains permanently in position on the axle. The bolt circle is $6\frac{3}{8}$ in. instead of the usual 5 in. Stout parkerized lock washers secure the nuts. As the Fairmont hub is not pulled from the



Fairmont demountable wheel of 16-in. rim can be exchanged rapidly if worn out

axle, no time is lost in refitting spoiled insulation. There is no re-gaging and re-aligning of wheels every time a tire wears out.

The bolted hub makes it possible for the car operator to keep his car safe by tightening the nut with an ordinary wrench, if any bolt loosens. With riveted hubs, no tightening is possible, and there is always a temptation for the car operator to continue to use the car until such time as it is more convenient to change the dangerous wheel which has loose hub rivets.

Since but two sizes of rims (16-in. and 20-in.) need be carried, and these fit every hub on the line regardless of axle size or taper, a maximum stock of 50 tires is ample, where hundreds of complete wheels were formerly stocked. After all cars are once equipped with bolted hubs, a hub stock of one or two of each size is ample, for the tight hubs are subject to practically no wear. Fairmont tires are furnished in both $\frac{1}{4}$-in. and $\frac{5}{16}$-in. plate, and nest handily in vertical stacks. A large wheel stock can thus be kept in one small room, and the few reserve hubs can be kept in small bins.

The application of Fairmont hubs, which are furnished in any size and taper of bore, reduces the wheel stock for all cars to two tire sizes (or four items if both $\frac{1}{4}$-in. and $\frac{5}{16}$-in. tires are used).

Light-Weight Spray-Painting Outfit

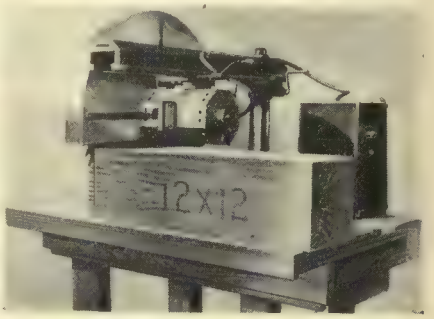
CONVENIENT portable apparatus for light-duty spray painting has recently been put on the market by the De Vilbiss Company. The light weight and compact size of this outfit make it extremely handy. The specially designed air compressor, and $\frac{1}{3}$-hp. universal electric motor which drives it, weigh only $5\frac{1}{4}$ lb. The spray gun weighs only $1\frac{1}{4}$ lb. and is said not to tire the arm even with long-continued use.

This apparatus has special features which are said to give it large capacity and unusual efficiency. The high air pressure produced by the powerful little motor and the design of the pressure-feed spray gun produce a complete, fine atomization of the material and assure the same good results achieved by big capacity outfits. Easy adjustments of the air cap of the gun enable the operator to atomize perfectly any of the various paints, lacquers or material that may be in use.

Two air caps give a choice of round spray or a full fan spray several inches wide. The pint size glass container has standard Mason jar thread. Ordinary Mason jars can be used for extra containers. The gun body and compressor housing are of high-grade aluminum alloy. Nozzle caps, fluid tip, valves and other parts are of brass, nickel-plated and nicely finished. It is designed to plug into any 110-volt electric socket. The complete unit consists of the Type GT spray gun, rotary compressor with switch, 15 ft. of air hose, and connections, 10-ft. extension cord and plug, and brass wire for cleaning.

Heavy-Duty Circular Saw for Track Work

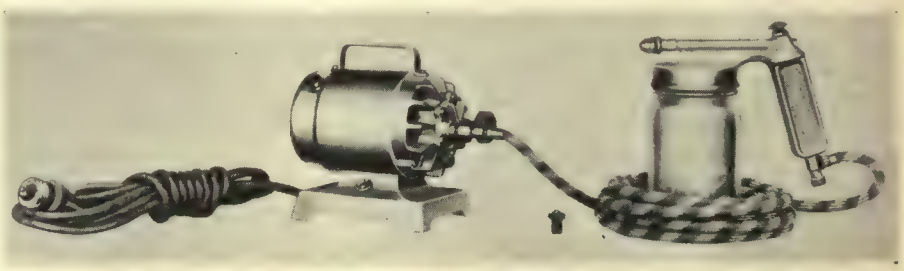
TO FACILITATE the cutting of heavy timber the De Walt Products Corporation of Lancaster, Pennsylvania, has developed a heavy-duty electrically driven circular saw. One man can operate this machine, feeding the saw with a hand ratchet gear feed or by chain feed on the arm of the machine. This arm may be



Heavy-duty cutting machine, Type L, handles timber of 12x12 in.

raised or lowered to depths of cut. Saw blades up to 36 in. are provided to handle 12-in.x20-in. material. The saw blade operates at 1,750 r.p.m. and is direct-driven by motor operated on either alternating or direct current in 220 to 550 volts.

This machine comes in two sizes, Models L and T, the capacity of the L type being 12x12 in. material, while the capacity of the T type is 12x20 in. The larger type is mounted on a metal table equipped with all-steel conveyor rollers for easy handling. The elevating device is operated by a wheel in front of the table which gives rapid elevation and ease in operation.



Light-weight spray-painting outfit manufactured by the De Vilbiss Company

NEWS *of the Industry*

LATE NEWS

Detroit, Mich. — Mayor Bowles has requested the Street Railway Commission to make an immediate survey to determine whether rate of fare on the municipal railway should be increased.

✦

Philadelphia, Pa.—In a round-up by the police against illegal parking, begun on Jan. 23, 77 cars were towed to four designated garages, where they were impounded until owners paid $5 towing charges and $1 storage fee. Fifty motorists reclaimed their cars by paying a total of $300. Inspector Wasing was in charge of the war on parking. He led 25 patrolmen and eight towing trucks through the central streets.

✦

Chicago, Ill.—Master in Chancery Mason has again continued the hearing involving a petition by the Chicago Rapid Transit Company for a permanent injunction to restrain the Illniois Commerce Commission from interfering with the straight 10-cent fare. The new date is Feb. 20. The continuance was at the request of representatives of the city.

✦

Baltimore, Md.—Officials of the Baltimore city law department are studying the United States Supreme Court's decision in the United Railways & Electric Company rate case. The city has been more or less of a silent observer recently so far as the United Railways' rate matters have gone.

✦

Dallas, Tex.—The Dallas Railway & Terminal Company increased its surplus reserves by $109,716 during 1929. This was $55,912 more than accrued to this fund during 1928. The surplus reserve accumulates only after the company is able to spend or put aside a fixed percentage of its gross revenues in repair, maintenance and depreciation reserves and then pay a 7 per cent return on property value. The gross earnings of 1929 were $3,319,132 with operating expenses of $2,329,455.

✦

Washington, D. C.—In the District Supreme Court, Justice Wheat has denied the motion of the Public Service Commission for dismissal of the appeal of the Washington Railway & Electric Company and the Capital Traction Company from the commission's order denying them an increase in fare.

✦

Aberdeen, Wash. — Two cars of the Grays Harbor Railway & Light Company have been repainted in a shade of orange enamel developed after years of experiment to secure a color easily visible in fog or rain but durable under the conditions here. This color, adopted as standard, contains less red than that formerly used. All cars on the system will be repainted as rapidly as possible.

(*Late News Continued on Page* 112)

Philadelphia Wrought Up Over Transit Tangle

The Suit in Equity Brought by the City Results in Lively Sessions and Sensational Comment—A New Deal Is Likely

EARLY in January hearings were begun before presiding Judge Harry S. McDevitt in Common Pleas Court in Philadelphia in the equity suit brought by City Comptroller Will B. Hadley against the Mitten corporations, not only demanding a complete audit but asking for the end of Mitten Management's control of the transit system. After a few sessions the court observed that things were "going from bad to worse" and the result was that the equity suit hearings were transformed into a series of round-table conferences which, as indicated in ELECTRIC RAILWAY JOURNAL NEWS for Jan. 25, may mark the birth of a new transit policy for the city.

Behind closed doors in Judge McDevitt's court room Mayor Mackey, Deputy Comptroller S. Davis Wilson and representatives of the City Council and the Mitten interests decided that four transit experts, one each for the four persons or groups represented, would be designated to formulate recommendations as to the future of the transportation system.

NEW RELATIONSHIP MAY RESULT

The way was thus opened for a readjusted relationship of the city and the rapid transit company that may involve the municipal condemnation of the entire transit system, the ousting of the Mitten interests as managers and the appointment of a new managerial organization. Certainly the developments are attracting wide attention, so much so that they have been made the topic of a special article in the New York *Times* by Lawrence Davies This observer even goes so far as to say that despite denials from one or two of the concerns mentioned in the speculation, suggestions in political and financial quarters that the move for a "re-deal" has the backing of interested banking and public utility corporations eager to gain a foothold in the Philadelphia transportation field have won credence in the last few days.

The early days of the equity suit were spent in the bickering of opposing counsel in revealing intricate phases of the financial relationships among the Philadelphia Rapid Transit Company, Mitten Management, Inc., Mitten Bank, Mitten Bank Securities Corporation and other Mitten interests, including charges that Thomas E. Mitten and his son and successor, Dr. A. A. Mitten, were sole owners of the stock of Mitten Management, Inc., which collected an annual fee of $1,100,000 for P.R.T. operation; in adducing from the city's representatives on the P.R.T. board, Joseph S. McCulloch and Ernest T. Trigg, that they knew little of the company's operations, especially as to its financial transactions; and in warnings from the judge that the case must be tried in court and not in the newspapers.

This last admonition followed the release to the newspapers of the city's answer in the suit before Deputy Comptroller Wilson, its chief of counsel, had turned the papers over to the court. After Mitten lawyers had described the answer as "vitriolic, defamatory, malicious and scandalous" Judge McDevitt received Mr. Wilson's apology and ordered him to file an amended paper with the "vitriolic comment" deleted.

Ellis Ames Ballard and associated counsel for the Mitten interests have taken the position that although the late Thomas E. Mitten dominated the transit company's affairs, his domination had brought the P.R.T. operation to "as high a plane of excellence as that attained by any surface street railway in any metropolitan area in the United States, and that the relations existing between the men and management had been brought to a degree of harmony unsurpassed in any other community." They have contended that the regulatory power and jurisdiction over the P.R.T. methods and classification of its accounts rests exclusively with the Public Service Commission.

The hearings have had their amusing incidents as well as the revelations that produced headlines for the Philadelphia papers. Deputy Comptroller Wilson, although not a full-fledged member of the bar, was authorized to prosecute the suit, but was assisted by Assistant City Solicitor John J. Elcock. Mr. Elcock one day protested to Judge McDevitt that Mr. Wilson paid no attention to him. All he had to do was to sit and twiddle his thumbs. The judge bade him find a comfortable seat and cease worrying about his inactivity, for "the public understands the situation."

Former Senator George Wharton Pepper, former Judge James Gay Gordon and other prominent lawyers associated with the Mitten side, have been by turns enraged, exasperated and caustically tolerant of Mr. Wilson's prosecution methods. That these methods have been unorthodox even the critical Philadelphia *Record* has been forced to admit. Of him that paper felt required

(*Continued on Page* 114)

LATE NEWS

(*Continued from Page* 111)

New Orleans, La.—For the first time since the beginning of the beautification work on Canal Street, which necessitated the rerouting of cars of the New Orleans Public Service, Inc., six lines using tracks in this street resumed operations there on Jan. 19. The new rerouting is expected to facilitate the movement of traffic in Canal Street, lessen congestion, and speed up the railway service.

✦

New York, N. Y.—The Regional Plan Committee made public on Jan. 25 the detailed studies of its engineering staff on the subject of the Brooklyn and Queens approaches to the projected 38th Street-East River vehicular tunnel. They have an important bearing on the recently announced proposal of the New York and New Jersey tunnel commissions for a highway connection between Long Island and Weehawken, N. J. Several months were required by the engineers for their studies.

✦

Kennebec, Me. — Directors of the Androscoggin & Kennebec Railway deferred payment of the dividend due Dec. 1, 1929, on the company's 6 per cent cumulative preferred stock.

✦

Dayton, Ohio—The Cincinnati & Lake Erie Railroad has formed an honor club for employees of its predecessor companies who have seen continuous service of 25 years or more. At the organization banquet on Jan. 22, 39 employees, eligible for membership, attended. Each of the men was commended by Dr. Thomas Conway, Jr., president of the railroad.

✦

Philadelphia, Pa.—Backers of the project of a competitive taxicab service have appealed to the Superior Court against the ruling of the Public Service Commission assuming to grant a monopoly in this field to Philadelphia Rapid Transit and Mitten Management. The position of the commission in its ruling was that "the time has come when regulated monoply is the best means of taxicab operation."

✦

Washington, D. C.—The Parker bill, for regulation of buses operating in interstate commerce, was considered in executive session on Jan. 24 by the interstate commerce committee of the House, The committee voted in favor of the provision requiring certificates of public necessity and convenience before any buses are permitted to operate in interstate commerce. It is said that the bill will be reported favorably to the House very soon.

✦

New York, N. Y.—At a meeting of the Board of Estimate on Jan. 24 at which the matter of granting a franchise for a bus line in Brownsville, Brooklyn, to the Eastern Parkway, Brownsville & East New York Transit Relief Association came up, Mayor Walker announced that consideration of the franchise would be deferred until April 25, asserting that the city was not in the mood for granting a franchise to this or any other company until the Legislature had disposed of his bill, now pending, which would provide unified bus transportation.

Geneva, N. Y.—The Public Service Commission has approved the assignment by the Geneva Railway Bus Lines, Inc., to the Colonial Motor Coach Corporation of the certificate granted by the commission to the Geneva company on Jan. 29, 1929. The certificate covers the bus line running from Geneva to Seneca Falls. The commission has also approved an amendment to the certificate calling for operation over other streets than those named in the original consent by the city.

✦

Seattle, Wash.—Salesmanship on the part of trainmen and others that will resell street car and city bus service to those who have been gradually withdrawing their patronage from the Municipal Railway during the last few years, has been demanded by George B. Avery, superintendent of public utilities.

✦

Boston, Mass.—The Boston Elevated Railway is advertising in display space in the daily papers its success as a competitor in the Brady Award contest, in which, in its class, the company was declared to have done most "to conserve the safety and health of the public and its employees," in 1928.

✦

Detroit, Mich.—The Detroit & Port Huron Shore Line Railway, the Rapid Railway and the Port Huron City Electric Railway have been sold at public auction to Roger I. Marquis and Augustus C. Ledyard, representing the bondholders protective association, on their bid of $300,000. There were no other bids. The sale is subject to confirmation of Judge Charles C. Simmons of the federal court.

✦

Atlanta, Ga.—A new issue of Georgia Power Company $6 preferred stock was placed on the market Jan. 1. This stock is offered for sale at $100 per share plus accrued dividends, both for cash and on a partial payment plan. It is cumulative and is redeemable at $110 per share plus accrued dividend. Employees are being paid a special commission of $1 per share for selling this stock.

✦

Bloomington, Ill.—The Illinois Power & Light Corporation has formally accepted the new twenty-year franchise with terms practically the same as those of the preceding contract, except that wider latitude is given to the company in the establishment of bus lines to supplant railway lines.

✦

Syracuse, N. Y.—The committee representing the New York State Railways 50-year first consolidated mortgage bonds series "A" and "B" has announced an extension of time for the deposit of the bonds to Feb. 18, 1930. Receivers for the New York State Railways were appointed on Dec. 30, 1929, by the United States District Court for the Northern District of New York and they are now operating the properties.

✦

New Orleans, La. — Records up to Jan. 2 show the bombing of 64 trolley cars of the New Orleans Public Service, Inc., since the strike of union crews last July.

Evansville, Ind. — The Evansville & Ohio Valley Railway, operating a railway to Rockport and Grandview, Ind., and bus lines to Mount Vernon, Ind., Tell City and Cannelton, Ind., and Henderson and Owensboro, Ky., is advertising its business intensively in the Evansville and Owensboro newspapers. According to Ray Millican, general manager, the new year has started well with the company's passenger and freight business showing a nice increase over the corresponding period last year.

✦

St. Louis, Mo.—Murray J. Douglas and L. A. Graeser, former president and secretary, respectively, of the St. Louis local of the Amalgamated Association, as trustees of the Sick Benefit Association of the union are suing the Union Labor Insurance Agency and the Southern Surety Company to reinstate a contract for a sick and accident insurance for members of the union cancelled last October by the Southern Surety as improperly drawn. All claims prior to the cancellation of the contract were paid in full. The court is asked to compel the Southern Surety to pay all the claims that have come up since the cancellation.

✦

Hartford, Conn. — The Connecticut Company discontinued its High Street bus line on Jan. 26 under authority of the Public Utilities Commission, which accepted the declaration of the company that the route was unprofitable. Frequent transportation over alternative routes, the commission believes, compensates for less frequent transportation afforded by the High Street service.

✦

Washington, D. C.—The Washington Railway & Electric Company and the Capital Traction Company on Jan. 21 voiced their objections to Congress to the proposal for their merger sent to the Capitol by the Public Utilities Commission.

✦

Alameda, Cal.—Arrangements have been practically completed between the city and the Key System Transit Company, whereby the Key System will use for trolley support the new electroliers to be installed on Park Street in Alameda between Clement Street and San Jose Avenue. Present plans call for the removal of all Key System trolley poles on this portion of Park Street. Trolley wires will be fastened directly to the electroliers.

✦

Philadelphia, Pa. — The Council's transportation committee has selected Roosevelt boulevard as the route for the construction of a $30,000,000 high-speed feeder line to the Broad Street Subway. The new subway will extend from Broad Street and Hunting Park Avenue along the boulevard to Pennypack Circle. The committee has also recommended that the Council employ Sol M. Schwab, former city consulting engineer, as a transit expert to advise the legislative body in negotiations with P. R. T. for a new operating arrangement on the North Broad Street Subway. In addition the committee has approved an enabling ordinance appropriating $7,000,000 for relocating the Market Street Subway's elevated tracks under the Schuylkill River and authorizing the director of transit to advertise for proposals and enter into necessary contracts.

More Than $5,000 a Day from Third Avenue Buses

Receipts of the Third Avenue Railway, New York, from bus operation are between $5,000 and $6,000 a day. These bus receipts are not included in the receipts of the railway system, only the net from bus operation appearing in the income statement. During the past year there were extraordinary expenses due to the installation of new lines and equipment. The buses are being depreciated on the basis of a five-year life which takes care of the equipment notes issued for a larger part of the buses. Under these conditions, the bus operation showed a deficit of $287,775 for the year. It is believed that in a very short time the bus operation of the system will show profitable present operation with great possibilities for the future. President Huff says:

"The threat of the destruction of trolley lines by bus competition has disappeared. The bus lines now in operation have been laid out in the main to feed and supplement existing trolley lines. It has been a long, tedious process of education both of ourselves and the communities in which we operate in arriving at fair and reasonable conditions of operation. We have had many municipal authorities to deal with in Westchester County, and it has taken time to reach a fair basis for carrying on a business that of necessity has to look somewhat to the future for its rewards."

Adding to Income with Package Service

The Lehigh Valley Transit Company, Allentown, Pa., has instituted a package service upon its Liberty Bell limited cars, which cover the 60 miles between Allentown and Philadelphia. Frequent requests have been made by firms with small parcels requiring quick delivery to Philadelphia and way points, to have the crews perform this service. It has not been a question of money; the requirement was fast delivery. Space was available in the motorman's cabin to transport a considerable number of packages without any inconvenience. The railway, therefore, announced that baggage tickets costing 50 cents could be secured. The packages or parcels are delivered by the sender at any of the baggage rooms along the route. Here they are loaded upon the cars, and dropped off at the various stops requested. Packages must be under 50 lb. in weight and must not exceed 4 cu.ft. in capacity.

More Maneuvering in Chicago

The Chicago City Council's local transportation committee on Jan. 27 unanimously voted an expenditure of $30,000 from the traction fund for the preparation of actual plans and specifications for a State Street subway. The specifications will be written into an ordinance for the construction of the subway by special assessment, with property owners sharing the cost with the city.

At this same meeting John Maynard Harlan, attorney for an Eastern group seeking a franchise, charged that the committee of bankers appointed by Samuel Insull does not really exist, that A. W. Harris has never accepted his appointment, and that the committee would have difficulty in showing that it has ever met.

The Aldermen discussed and shelved for three weeks Alderman Guernsey's request that March 15 or April 1 be set as a date on which franchise contenders should submit transit ordinances. This was done because the sub-committee is working on an ordinance draft with the surface and elevated lines. Alderman Guernsey's plan for a subway in solid rock 125 ft. below street level was turned over to the engineers for study.

On Jan. 21 the Chicago City Council's transportation sub-committee submitted a dozen changes which it has made in the new co-ordination ordinance to Attorney Walter L. Fisher, legal representative of Federal Judge James H. Wilkerson. The changes are all technical and tend to strengthen the city's position. If they pass Attorney Fisher, the changes will then be submitted to the local transportation companies and to the citizens' committee.

No Propaganda in Boston Broadcasts

Radio broadcasts started by the Boston Elevated Railway, Boston, Mass., to stimulate patronage and increase good will toward the road have caused Representative Sullivan, of Dorchester, to protest to Governor Allen, asserting the broadcasts were being utilized to urge continuance of public control.

Chairman Harriman of the trustees of the company has replied that the purpose of the broadcasts was simple and direct, namely, to attract more riders to the system. He said in part:

"In recent years the trustees have appropriated moderate sums for advertising to stimulate riding. The radio broadcast is in line with this effort. We believe that the objects sought are all within the scope of legitimate advertising, that the returns will be commensurate with the small expenditure and that the effort indicates a management alert to the requirements of present business methods.

"It is not the intention of the trustees now or later to attempt in any way to influence the public mind with respect to the future organization of the Boston Elevated Railway. We intend simply to tell the facts with regard to the service as they are today and explain how the road has been operated under public control."

Mr. Harriman attached a list of electric railways using the radio for advertising purposes and an article from *Aera* explaining its use in this connection.

Ancillary Receivers for New York State Railways

Judge Adler in the United States District Court in Buffalo, N. Y., has appointed William T. Plumb and Benjamin E. Tilton as ancillary receivers for the properties of the New York State Railways following an equity receivership action against the company brought by the General Finance Corporation, Utica. Judge Adler instructed them to continue the lines in operation and submit a detailed report of the condition of the company. The receivership order enjoins all creditor interests from instituting court actions against the receivers on past due claims.

Storm Hits Portland, Me.

Electric railway service at Portland, Me., was hampered severely during the week ended Dec. 21 by the double sleet storm which cut off all incoming power service and threw the lighting, power and railway load upon the Cape steam plant of the Cumberland County Power & Light Company. "At no time was trolley service completely disrupted in Portland," said Fred D. Gordon, vice-president and general manager, to a representative of the Electric Railway Journal.



Obstacles to Electric Railway Service in Portland

De Luxe Service in Cleveland Popular

The permit for the 25-cent express motor coach service started by the Cleveland Railway between Cleveland and Cleveland Heights on Dec. 7 has been extended for six months by the Cleveland Heights Council. The original grant was for 30 days. Officers of the Cleveland Railway are pleased with the results, particularly as all the regular customers provided their own transportation to the business district prior to the time the express service was started and thus, in a small way, at least, the express service is an aid to railway service by helping to reduce traffic congestion.

The express coaches make fast time. The aim is to give every passenger a seat, but during the rush hours this is not always achieved.

The Heights line is the first regular express service the railway has been able to operate in the Cleveland district. Moreover, it is the first local transportation line furnishing service to the Van Sweringen's new union terminal and it provides the only direct service between the Van Sweringen terminal and the Pennsylvania's East 55th Street station.

Philadelphia Wrought Up Over Transit Tangle

(*Continued from Page* 111)

to say: "Yes, Mr. Wilson is an inflammatory and rather incalcuable factor in the transit controversy. He is impulsive, undisciplined, intractable. He ignores the traditions of the game and defies its rules. He is a perpetual insurgent, an implacable guerrilla; a shrill note of discord in the legalistic symphony; a bull in the equity china shop; a burr under the saddle of justice—pick your own metaphor. But he survives and he produces."

Included among the statements of Mr. Wilson which brought down upon his head the censure of the court were in substance the following:

"Control of P.R.T. by Mitten Management was obtained through the alluring offer to P.R.T. employees to give them stock therein through the bonus system. When these stocks aggregated majority control Mitten compelled the employees to turn over P.R.T. stock for securities in his private enterprises, illegally financed by P.R.T. funds . . . As the plan progressed Mitten Management would have become sole owner of P.R.T. without the investment of one dollar . . .

"P.R.T. men have never had a fair voice in the management and policies of P.R.T. Their bonus stocks were exchanged for stocks in Mitten enterprises. P.R.T. men became obligated to Mitten Management rather than to the public. . . .

". . . . a gesture of Mitten that he was founding an industrial democracy—of which, however, he was the autocratic and aggrandizing head, in the interest of himself and of the Mitten interests."

In a flaming editorial in which the *Record* asked whether after all Mr. Wilson hadn't performed a public service in showing that "there isn't any Santa Claus behind those Mitten Management whiskers," that paper admitted that "Mr. Wilson deserved his spanking as the Bad Boy of the transit litigation."

That of course is a striking instance of the extent to which the animosities have been carried. The important thing, however, is the constructive side of the picture. The round-table conferences were agreed upon after the deputy comptroller had suggested to the court the city's purchase at par of the outstanding $30,000,000 of P.R.T. common stock, the $14,000,000 of preferred stock and the $25,000,000 of bonded indebtedness, as well as the condemnation of the underlying companies for $80,000,000. This estimate would bring the total price to $149,000,000.

Mr. Wilson pointed out that elimination of Mitten Management would save a yearly fee of $1,100,000, and he figured that there would be saved also $8,000,000 which the company pays annually as underlier rentals and $2,400,000 in annual dividend requirements. He also declared the $800,000 paid yearly to P.R.T. officials was excessive.

Judge McDevitt in agreeing to the conference plan called attention to the division of transit system ownership among the city, the P.R.T. and the underlying companies. He said:

"The sooner we face the music and realize that somebody has got to take over all of this—and probably the city—and run it by competent management and executives the better off will all be. Now, if we can solve that problem and put the transit system where it belongs, pay a fair and reasonable price for it, and then permit the city to employ competent persons to operate it, you will be infinitely better off than you are having a contract with P.R.T. and they with Mitten Management and the Mitten Bank Securities Corporation and three or four other companies, where it is almost as impossible to unscramble them as it was to unscramble the railroads after the war. They have become so intertwined and interwoven now that I cannot put my finger on the line of demarcation in any of the evidence that has already been produced."

As Mr. Davies sees it, to many observers any agreement on terms for possible condemnation of the whole transit system seems far distant. Skepticism is the reigning state of mind. And in the meantime the clamor grows for speedy tunneling under the Schuylkill River in order to lay the West Philadelphia elevated tracks underground in preparation for the Pennsylvania Railroad improvements and for the extension of the city-owned Broad Street subway into the northeast section. In short, transit has become the urgent outstanding problem of the Mackey administration.

Company Makes Subway Operating Proposal

In the interim A. A. Mitten, chairman of the board of the Philadelphia Rapid Transit Company, in an open letter to Edwin R. Cox, president of the City Council, has made the following suggestions as a basis for consideration and discussion of the lease by the city of the Broad Street subway.

1. Up to such date as a new lease should be signed Philadelphia Rapid Transit will bear and absorb without reimbursement from the city the loss which stands today at over $800,000 and is being reduced at the rate of about $40,000 per month.

2. Philadelphia Rapid Transit will sign and urge upon the commission for its approval a new lease to run from year to year from the date of its execution which shall contain the following terms:

(a) Philadelphia Rapid Transit as lessee to operate the subway as part of the unified system.

(b) Philadelphia Rapid Transit to pay to the city monthly the net addition to its net revenues arising from Broad Street subway operation for the preceding month as reported by the board of ten, which board should be continued for this purpose.

(c) In computing subway operating expenses the board shall include to cover general and management expenses 2 per cent of subway gross revenues; this because thus far the board has included nothing on this account.

(d) In case for any reason, such as opening of subway extensions, the subway shall cause a loss in P.R.T. net revenue for one or more months, P.R.T. shall not be entitled to any repayment by the city, but such loss shall be made up from the increased revenues from subsequent months and thereafter P.R.T. payments to the city shall be resumed.

(e) Such lease to run from year to year terminable by either party at the end of the first or any later year on three months prior written notice.

Mr. Mitten stated in the letter that loss in addition to rental to P.R.T. for the full fifteen months period of operation of the subway amounted to $826.603, although for the month of November, as for several other recent months, the subway has proved a slight financial benefit to the whole system.

That progress is being made at the round-table conferences is attested by the announcement made just before this issue of the JOURNAL went to press that the committee of four to which reference has been made will comprise Dr. Milo R. Maltbie, for the city comptroller; S. M. Swaab, consulting engineer, for the City Council; W. K. Myers for the P.R.T., and J. A. Emery for the Mayor. They have been instructed: (1) to make a survey of transit facilities; (2) to make a study of transit finances; (3) to make a survey of the underliers; (4) to analyze the city-company operating contract; (5) to recommend methods by which the situation can be worked out, and to estimate the results.

WATCH FOR

A.E.R.A. Transportation Committee's Illustrated Brochure Covering Three Special Trains

to the

San Francisco Convention

and

General Convention Information

To be mailed from

Association Headquarters Feb. 15

Underground Headquarters London's Highest Commercial Structure

The fine new headquarters of the London Underground Railways combine, constructed above St. James's Park Station and crowned with a floodlighted tower that is one of London's newest and most outstanding landmarks, is now in full use. The exterior of the building takes the form of a huge white Latin cross. It has been made familiar to the London public through the controversy which the Epstein sculptures aroused. The interior has no such suggestion of towering solidity. The impression is rather one of simplicity, softness, and polished cleanness.

The whole building gives a sense of utility and of a certain austerity without discomfort. It has its own water supply pumped from an artesian well 500 ft. below the ground level to tanks alongside the balconies of the tenth and top floor. Its electricity is drawn from Lot's Road power station of the Underground Company, and transformed to the required voltage in the basement. Here, too, are an automatic telephone exchange and a kitchen for the supply of afternoon tea to the 1,000 occupants of the offices. The business part of the building extends upwards only to the tenth floor, but above that rises the tower with a 60-ft. flagpole above it. This is both a landmark by day and by night. It affords a fine view to those who are privileged to ascend it.

Not being a virgin site, certain inherited difficulties presented themselves in the construction of the building. St. James's subway station and the contiguous railway ran across a portion of the site only a few feet below street level. The foundation of the building in this region had to be straddled over the subway and the framework stanchions based on cross girders some 54 ft. in length, bridging it. The girders themselves rested on group piles at each side of the railroad.

The building is the highest commercial structure in London.



Impressive structure which houses London Underground officers and staff

476 Miles to Be Electrified in Switzerland

The complete list of railway lines in Switzerland to be electrified within the next seven years is as follows:

Line	Length in Kilometers	When to Be Electrified
Neuchatel-Chaux-de-Fonds-Col-des-Roches	38	1930–31
Delemont-Basel	38	1930–31
Delemont-Delle	40	1931–32
Wallisellen - Uster - Rapperswil - Uznach-Ziegelbrucke	46	1931–32
Zurich-Affoltern-Zug	36	1931–32
Biel-Sonceboz-Chaux-de-Fonds	44	1932–33
Berne-Lucerne	84	1932–34
Rorschach-Buchs	49	1933–34
Gossau-Sulgen	23	1934–35
Neuchatel-les-Verrieres	35	1934–35
Sonceboz-Moutier	25	1935–36
Guibiasco-Locarno	18	1935–36
	476	

Sydney, Australia — Construction of Eastern Suburbs Electric Railway in New South Wales has been postponed owing to shortage of funds for new works.

Paris Subway Fusion Takes Effect

Amalgamation of the Metropolitan and the Nord-Sud railways of Paris gives Paris a unified subway system with more than 200 stations and approximately 70 miles of double track. There has always been a close working agreement between the two lines, with interchange of traffic. From the administrative and operating standpoints, however, useful economies may be expected. It has been reasonably claimed for Paris that, in proportion to its size and population, the city has a more closely-woven network of sub-surface railroads than any other city in the world, there being, roughly speaking, 1 mile of double-track underground railroad to every 42,857 of inhabitants. Yet in many respects comparison between the underground transport system of Paris and similar systems in other large cities cannot be justified, because at present, in the case of the French capital, all of the lines terminate at the city boundary. In the not distant future, however, this condition will be altered, for several lines which extend into the nearer suburbs are scheduled for early construction, and one is even now being built. There is also a larger project, which has been sanctioned by the Prefecture of the Seine, which will carry the lines still further afield, and thus bring Paris into line with large metropolitan centers elsewhere.

Rome, Italy—Rome is at last to have its metropolitan subway system, the decision having been made at a recent meeting of the Superior Council of Public Works. The system will, when completed, consist of three lines, called A, B, and C. Line A's total length will be between 6 and 7 miles. It will cost $16,500,000. Line B will be 3½ miles long. It will cost about $8,600,000. Line C will be nearly 5 miles long. It will cost $13,000,000. The project is particularly opportune at this moment, when it has been already decided to abolish the surface railways from the center of the city. With the abolition of the street cars, a so-called zone of silence is to be created in the center of the city.

✦

Manchester, England—Since bus traffic is eating into the tramway revenue the tramways committee has resolved to curtail the normal tram car building program and to reduce expenditure on tramway tracks. R. Stuart Pilcher, tramway manager, says that the number of tramway passengers during the year ended March 31, 1929, had decreased by more than 5,000,000 compared with the previous year, while the number of bus passengers had increased by about the same amount. Both undertakings are run by the municipality. Mr. Pilcher recommended improvement in the tramway rolling stock, both as to seating and lighting. In a bill which the Manchester Corporation is promoting it seeks authority to run buses beyond the city, to carry freight, to enter into working agreements with other local authorities and with companies in reference to buses, and to substitute trolley vehicles or buses for existing tramways. Some of these powers are covered by the Government's road traffic bill.

$112,000,000 in Subway Contracts in Year in New York

The New York City Board of Transportation awarded more than $112,000,000 in rapid transit construction contracts in 1929. Contracts for eleven sections of the new city subway system and for equipment, cars, motors, signals, tracks and stations needed for its operation accounted for $109,512,644 of this amount. The rest was allocated to work done on the B.-M.T. and I.R.T. systems under their contracts with the city.

About $140,000,000 worth of contracts will be let during 1930. It is expected that within a short time, with the letting of the contract for the new bridge over the Gowanus Canal, an entire trunk line of the city's new subway system, except for a short link connection to the recapturable B.-M.T. Culver line, will be under construction from Broadway and 215th Street in Manhattan to the ocean front in Coney Island. The Manhattan division is now nearing completion, the spring of 1931 having been set as the date for operation of the line from the Harlem River to Chambers Street.

According to the board the $5,000,000 car shops, storage and repair yards at 207th Street on the Harlem River water front will be finished before next spring.

Columbia Abandonment Case Before Supreme Court

The United States Supreme Court has consented to pass upon the suit between the state of South Carolina and the Columbia Railway Gas & Electric Company which originated over the suspension of railway operation in Columbia. The Supreme Court of South Carolina held that the franchise linked inseparably the operation of the electric street railway, light and power businesses—all public services—and that the railway service could not be separately abandoned. The company appealed to the Supreme Court from the decision of the state court. In their brief to the court requesting that the appeal be dismissed, the state and the city authorities contend that they have never held that a unit charter requires railway operation at a loss. They contend, however, that the company has not made an honest effort to make the service pay.

More Time Asked to Perfect Omaha Rerouting

Growing dissatisfaction with the rerouting of the Omaha & Council Bluffs Street Railway System as a result of a traffic survey conducted by Ross W. Harris, resulted in a well-attended City Council meeting on Jan. 20, open to the public. Pressure was brought to have the Council at a forthcoming meeting instruct the company to restore the routing in effect before Dec. 8.

President Shannahan requested that 90 days be allowed the company in which to make such changes as it found necessary to improve the new system, and also that the company's request for restricted parking on the main downtown streets during rush hours be granted. His request for the 90 days was denied, but the City Council passed an ordinance ordering only parallel parking on the main downtown thoroughfares during rush hours This ordinance is to become operative on Feb. 1. Mr. Shannahan said:

"In our opinion adequate and satisfactory service which will keep the present benefits can never be devised and supplied if changes are imposed upon the system each week. Attempts to give various groups of people exactly what they want, without reference to the rest of the system, will result eventually in no service to anybody."

His position was that if the public was not disposed to permit the company successfully to work out the rerouted system, the only alternative was to return to the old system.

Rearranging Parked Area on Broadway

W. G. Fullen, chairman of the New York Transit Commission, has proposed a plan for remodeling the park plots in Broadway, between Columbus Circle and 120th Street, to provide for inside entrance and exit on Broadway surface cars and elimination of the hazard to passengers presented by vehicular traffic in that thoroughfare. Police stanchions, forming safety zones for use of surface car passengers, have been found to afford inadequate protection. The Transit Commission would cut down the park space in the centre of the roadway, with sidewalks 4½ ft. wide installed on either side. Rearrangement of the doors on the surface cars, which officials of the Third Avenue Railway have agreed to make, will provide entrance and exit facilities on the "off" side. This new arrangement would permit several cars to stop in one block to take on and discharge passengers.

Company Rejects Proposed Jacksonville Franchise

Formal rejection by the Jacksonville Traction Company, Jacksonville, Fla., of the Miller draft of the proposed new franchise has been announced by J. P. Ingle, manager of the company. Mr. Ingle said in part:

"The operations of this company for the year ended Sept. 30, 1929, resulted in a deficit of more than $60,000 after interest charges on its debt. No dividends have been paid on the preferred stock since 1916 and none on the common stock since 1914. With the first mortgage bonds of the company maturing March 1, 1931, and its present franchise expiring Jan. 15, 1932, and with the present earnings, it will be impossible to provide new money to pay these bonds at maturity or to pay for improvements. Recognizing this situation, the company has sought honestly and earnestly for a new franchise fair to it and to the city.

"The franchise recently prepared by the city attorney is even more burdensome than the present one. Under the proposed terms the company could not survive.

"We desire earnestly to co-operate with you in a fair solution of the situation and will welcome an opportunity to negotiate with you on such a basis. We are convinced, however, that no solution could be reached on any terms even approaching those in the proposed franchise and we therefore feel that an attempt to arrive at a workable franchise from such a base would be of no avail.

"We hope sincerely that you will recognize the justice of our position and order a new draft prepared which will make possible the object we both wish to accomplish, namely, adequate service to the public on a fair basis."

Attractive Transportation Guide to Binghamton

The first issue of the "Triple Cities Transportation Guide," published by the Triple Cities Traction Company, Binghamton, N. Y., has been mailed to more than 40,000 persons and concerns in the community, through the co-operation of the Binghamton Light, Heat & Power Company. In an introductory statement, attention is invited to the fact that the company serves a community of 130,000 population, has 50 miles of trolley tracks, operates buses over routes aggregating 30 miles, and has a universal transfer system which allows patrons to complete their journeys by bus or trolley without additional cost. The guide lists all trolley and bus lines, with their transfer points, and gives time schedules. The last page of the folder carries a half-tone reproduction of a photograph of the first electric car in Binghamton, taken in July, 1886.

Status of Service-at-Cost at Rochester

With the New York State Railways thrown into a receivership, status of the service-at-cost contract between the railways and the city of Rochester is doubtful. The contract would expire on Aug. 1, but under its provisions, in the event of a receivership, it becomes void unless the City Council passes special legislation to retain it. If the contract is declared void, a 5-cent fare automatically goes into effect under a strict interpretation of the terms of the document. Realizing that such a course would be ruinous to the company it is believed that the Council will authorize retention of the present contract until Aug. 1. It is expected that negotiations will be started at once toward drafting a new contract. A deadlock on all municipal legislation in 1930 is threatened, with four regular and four insurgent Republicans, and the Mayor too ill to take part.

No Hope for Seattle to Do Better on Purchase

Councilman Blaine, head of the finance committee of the City Council of Seattle, Wash., who is on a visit to eastern cities, says that, in his opinion, Seattle has virtually no chance at this time of refinancing its municipal railway purchase debt with new bonds longer in life than those issued originally. He declares the two-year moratorium arranged by Mayor Edwards with A. W. Leonard, president of the Puget Sound Power & Light Company, offers the city the only way out of the critical financial situation affecting the railway. During his absence, Mr. Blaine's colleagues have passed an ordinance providing for acceptance of the two years extension of time on the 1930 and 1931 installments offered by Mr. Leonard. They are now considering passage of an alternative bill which would provide for actual retirement of the 1930 installment of $833,000 with new twenty-year bonds.

Renewal of Toledo Ordinance an Issue

City officials of Toledo, Ohio, are studying the Milner ordinance, under which the Community Traction Company operates, in an effort to prevent any increase in the fare due to the provisions of the ordinance. After the expiration of the first ten years of its operation, the ordinance must be extended or an amortization fund be set up to retire the bonds and preferred stock of the Community Traction Company. Street Railway Commissioner E. L. Graumlich estimated that a fare increase of 1½ cents over the present rates would be necessary to set up the required amortization fund. In the event that the Milner ordinance is extended, this amortization fund will not be necessary immediately. Martin S. Dodd, city law director, said the question of the necessity of submitting this ordinance to the people for renewal is debatable.

Suggestions from Railway President on St. Louis Problems

Stanley Clarke, president of the St. Louis Public Service Company, at a meeting of the Transportation Survey Commission, on Jan. 23 took issue with some of the recommendations made in the reports of R. F. Kelker, Jr., consulting engineer of the commission, relative to traffic improvements. At the suggestion of Mayor Miller, Mr. Clarke will submit a written report in which he will give his own suggestions for improving traffic conditions in the city.

Mr. Clarke expressed the belief that Mr. Kelker was considering the question in terms of vehicles rather than of people. Wider streets and super-highways would serve to bring more vehicles into the congested districts, while the big problem was how to get more people into the business section. This could best be done by making it possible for street cars to move more freely. He said that street cars do not require wide streets if other vehicles are kept out of the way.

Mr. Kelker concluded that subways downtown would not be of much benefit to street car riders, but Mr. Clarke held them of "immeasurable benefit."

In discussing traffic conditions in the business district Mr. Clarke pointed out that 40 per cent of cars on the Olive Street lines frequently are rerouted at Twelfth Boulevard due to congestion east of that thoroughfare.

South Shore Plans New Freight Terminal for South Bend

Another step has been taken by the Chicago, South Shore & South Bend Railroad in its plan to eliminate freight traffic over the city streets in the recent acquisition of an 11½-acre tract in South Bend for the construction of a new freight terminal. The acquisition and development of this property, according to plans of the line, will enable the company to offer shippers prompter and more convenient service, will eliminate the movement of freight over South Bend streets and will open up highly desirable sites for industries.

The company will develop the site as a freight terminal and industrial site with inbound and outbound freight tracks and houses. All present buildings are to be reconditioned and made suitable for the use of industrial tenants. The property is to be provided with adequate and suitable team tracks, and two large warehouses are to be reconditioned for use as inbound and outbound freight houses.

When the new terminal is completed, the South Shore Line will abandon its present freight terminal on LaSalle Street, and will discontinue the present method of handling less-than-carload freight in tractor-trailers over South Bond Street from the old freight house at Orange and Olive Streets to the LaSalle terminal.

Growth in freight business also has necessitated enlarging the South Shore Line's freight yard at Burnham, Ill. At the present time the yard has a capacity of 110 cars on two tracks. When the added trackage is installed, the yard capacity will be 550 cars. The project includes installation of two new main line tracks on the north side, the use of the present main line tracks for freight service and the addition of a fifth freight track. The yard is used for the classification of empty cars, to facilitate delivery and movement. Work on this project is now 60 per cent completed.

Abandonments in Indiana

Arthur W. Brady, receiver for the Union Traction Company of Indiana, has announced that service on the Muncie-Union City division will be discontinued on Feb. 8, and on the Anderson - Middletown division, Feb. 28. Authority for abandonment of the two lines was granted on Jan. 23 by Judge Morrow in the Madison County Circuit Court. The Public Service Commission approved the abandonment several months ago. The Muncie-Union City line is 32.6 miles long and the Anderson-Middletown division, 9.6 miles. Mr. Brady said:

"The Muncie-Union City interurban line has been a factor of importance in the social and business life of the communities it serves for a quarter of a century, and it is with regret and reluctance that the decision to terminate has been reached. That determination has been forced by conditions beyond the control of the company. In addition to the losses caused all railway lines by the constantly increasing use of automobiles, this division has suffered acutely from the abandonment of the old Union City-Dayton line, with which for many years it interchanged a considerable volume of business. The large deficits due to these causes it has proved impossible to overcome through fare revisions, improved service or other means."

Mr. Brady expressed appreciation for the efforts recently made by business men in communities along the line to canvass their towns for enough freight traffic to put the line on a profitable basis and thus forestall abandonment of the service.

One-Man Car Case Won by Shreveport Railways

As noted in ELECTRIC RAILWAY JOURNAL NEWS for Jan. 18, it has been indicated in a report of the District Court of the United States for the Western District of Louisiana, dated Jan. 6, in the suit in equity of the Shreveport Railways vs. City of Shreveport to enjoin the enforcement of an ordinance requiring two men on each street car, that the decree will insure the use of one-man cars: "the type of car which will give the greatest safety and efficiency." The case is important not only in its bearing on the one-man ordinance, but also because the power of the police to enforce a requirement of this kind was questioned. The report was signed by District Judge Ben C. Dawkins. It states in part:

No public service commission in any state now refuses to permit the use of one-man safety cars. Conditions are altogether different from what they were in 1917, when the Supreme Court rendered a decision in the Sullivan case favorable to two-man operation. Then the one-man car was in its experimental stage; now the safety car appears as safe as those operated with two men.

A municipality's right under its police power to interfere in matters of this kind exists only when necessary to the safety and convenience of the public. The philosophy of our institutions warrants reasonable regulations only, and there must be some real justification for the exercise of the power.

Street cars appear to be an essential means of transportation for a large portion of the population of cities and the loss of such service would be a serious handicap to a growing city. On the whole, I believe the refusal to allow the use of one-man cars of the latest type, at least until they can be properly tested, in the light of the proved experience of other cities, is arbitrary and amounts to a taking of the railway's property without due process of law, results in confiscation, and the enforcement of the ordinances complained of will be enjoined.

The comments of Judge Dawkins were preceded by a lengthy report of a master. Among his findings, included in the report, are:

That the city ordinances existed and would be enforced as alleged, unless the court intervenes; that the net return upon the present value of the railway was approximately 0.0243 per cent; that the property was economically managed; that operating expense, exclusive of depreciation and taxes, was 0.2323 cent per car-mile, as compared to 0.271 cent for 24 similar companies; that no dividends have been paid since 1923; that one-man operation will effect a saving of $93,922 a year in wages, and that it would not be necessary to discharge any employees in making the change.

That, from the evidentiary facts, the one-man car, a modern safety car equipped with all the automatic safety devices, has been shown by a clear preponderance of the testimony to be safer than its predecessor, the two-man car.

That the speed and schedules of street car systems have been increased under one-man operation, that companies are able to operate more cars, that wages have been increased, and that operators become more efficient and better satisfied.

That since 1917 no public service commission has refused to permit the operation of one-man cars, and since 1924, no commission has limited the right to use one-man cars subject to any particular conditions.

The court reserved to the defendants the right to apply for a modification of the decree should the conditions warrant.

The case for the company was most ably presented by W H. Armbrecht of Armbrecht, Hand & Twitty, Mobile, Ala., and A. B. Freyer of Wis., Randolph, Rendell & Freyer, Shreveport, La.

Southern Equipment Men Analyze Maintenance Practices

NO TYPE of equipment escaped analysis at the meeting of the Electric Railway Association of Equipment Men, Southern Properties, held at Birmingham, Ala., on Jan. 27, 28 and 29. All were covered in the papers presented, either from the standpoint of their maintenance or their application. Papers on maintenance subjects covered armature room tests, car lubrication and inspection. Other papers covered a variety of subjects, including the new Pittsburgh car.

Practically all of the second day was devoted to the discussion of the association's questionnaire. A total of 53 live questions were entered and each provoked many valuable ideas.

Every detail of Pittsburgh's new aluminum car was given by D. H. Bell, engineer of equipment Pittsburgh Railways, in the first paper presented. In introducing his subject Mr. Bell said:

"There undoubtedly exists in the electric railway industry today the economic need for a new vehicle to supersede the present street car. The need is paramount on account of the increasing competition of the private automobile and the motor coach. Whether this new vehicle will operate on the rails or rubber tires is at present impossible to determine because of the many variable factors. There are, however, certain fundamental characteristics which any new vehicle should embody if it hopes to find its place and be adopted by the electric railways."

An article describing the Pittsburgh car appeared in the JOURNAL for July, 1929.

Q. W. Hershey, supervisor of maintenance sales Westinghouse Electric & Manufacturing Company, in his talk on co-operation between operator and manufacturer, declared that "Probably no other businesses in the world are so intimately interdependent as are the electrical equipment manufacturer and the operator utilizing this equipment in public service."

According to Perkins Prewitt managing director Birmingham Safety Council "everything material wears out, and the only way to prevent accidents from equipment failures is to set a high standard of maintenance and accompany this character of work with frequent inspections."

Some of the tests more commonly used in the armature room and the merits of each were outlined by R. S. Beers, General Electric Company.

"Car Lubrication" was the subject of a paper prepared by A. T. Clark, superintendent of rolling stock and shops United Railways & Electric Company, Baltimore. Summarizing the results of more than three years of use of a new lubrication, Mr. Clark stated:

"Power consumption has been reduced and during the winter months shows only a slight increase over the summer months, improved lubrication as borne out by tests has resulted, cars drift and coast as never before due to better lubrication and greater air-brake piston travel, and the total cost of oils, wool waste and bearings on the car-mile basis is lower today than it was in 1926, notwithstanding the use today of higher cost oil and all wool waste."

"The urban transportation industry is confronted with a form of competition which came into being gradually and insidiously but which today is tremendously effective. I refer to the private automobile." With this introduction the paper on motor bus transportation, prepared by C. S. Sale, president of the American Car & Foundry Motors Company, and presented by L. H. Hyneman, launched into an analysis of recent bus developments. Mr. Sale referred to the difficulties surrounding rail operation in cities of from 50,000 to 75,000 inhabitants, and added that buses in many cases would reduce operating expenses and build up riding. The speaker also discussed the use of trackless trolleys for certain lines.

That close inspection, other than reducing maintenance cost, is nothing more or less than a necessary part of meeting the ever present public demand for better service was the key thought expressed by J. J. Vaughan, master mechanic Memphis Street Railway, in a paper on inspection.

"A New Era in Street Car Mechanics and Operation" was the subject of a paper by N. R. Brownyer, railway engineer Timken-Detroit Axle Company, presented by H. J. Lidkea. "There has been much conversation on the subject of modernization in rolling stock," Mr. Brownyer stated, "but too often this led only to a revision in paint schemes, floor coverings or seat styles, while improvements in the mechanics were invariably neglected." Mr. Brownyer outlined in detail the development of the new Timken-Detroit worm-drive truck and the features of the truck designed to reduce noise, lower maintenance cost, increase efficiency, reduce the unsprung weight, increase braking rates and improve the performance.

In discussing the possibilities of the electric coach, Walter S. Rainville, equipment engineer, New Orleans Public Service, Inc., said:

"We feel that its future is assured because it is speedy, safe, comfortable, dependable, economical and modern in every respect. It is improbable that the electric coach will displace the street car for handling mass transportation on heavy lines, but there are lines on which travel is light, where the coach can be substituted profitably. It should also find application in extensions to existing lines where additional track would involve heavy first costs.

Officers were re-elected at the opening of the third day. They are: A. Taurman, president; W. H. McAloney, vice-president, and L. O. Eiffert, secretary-treasurer.

Conspectus of Indexes for January, 1930

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years High	Last Five Years Low
Street Railway Fares* 1913 = 4.84	Jan., 1930 **7.85**	Dec., 1929 **7.78**	Jan., 1929 **7.71**	Jan., 1930 **7.85**	Jan., 1925 **7.24**
Electric Railway Materials* 1913 = 100	Jan., 1930 **144.4**	Dec., 1929 **144.9**	Jan., 1929 **145.3**	Dec., 1926 **159.2**	Feb., 1928 **139.5**
Electric Railway Wages* 1913 = 100	Jan., 1930 **231.3**	Dec., 1929 **231.1**	Jan., 1929 **229.9**	Jan., 1930 **231.3**	Jan., 1925 **221.0**
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	Jan., 1930 **204.5**	Dec., 1929 **205.1**	Jan., 1929 **204.5**	Nov., 1928 **205.7**	July, 1929 **199.0**
General Construction Cost Eng'g News-Record 1913 = 100	Jan., 1930 **209.0**	Dec., 1929 **209.5**	Jan., 1929 **209.4**	Jan., 1927 **211.5**	Nov., 1927 **202.0**
Wholesale Commodities U. S. Bur. Labor Stat. 1926 = 100	Dec., 1929 **94.2**	Nov., 1929 **94.4**	Dec., 1928 **96.7**	Nov., 1925 **104.5**	Apr., 1927 **93.7**
Wholesale Commodities Bradstreet 1913 = 9.21	Jan., 1930 **11.68**	Dec., 1929 **12.24**	Jan., 1929 **12.96**	Dec., 1925 **14.41**	Jan., 1930 **11.68**
Retail Food U. S. Bur. Labor Stat. 1913 = 100	Dec., 1929 **158.0**	Nov., 1929 **159.7**	Dec., 1928 **155.8**	Nov., 1925 **167.1**	Apr., 1925 **150.8**
Cost of Living Nat. Ind. Conf. Board 1914 = 100	Dec., 1929 **162.0**	Nov., 1929 **163.3**	Dec., 1928 **162.1**	Nov., 1925 **171.8**	Apr., 1929 **159.3**
Industrial Activity Elec. World, kw.-hr. 1923–25 = 100	Dec., 1929 **116.4**	Nov., 1929 **122.9**	Dec., 1928 **127.3**	Feb., 1929 **140.4**	Aug., 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	Dec., 1929 **98.6**	Nov., 1929 **111.2**	Dec., 1928 **106.6**	Oct., 1929 **111.8**	Nov., 1926 **94.0**
Business Failures Number	Dec., 1929 1827	Nov., 1929 1536	Dec., 1928 1673	July, 1929 1581	Sept., 1928 1348
Liabilities, Millions of Dollars	**68.33**	**53.86**	**47.04**	**102.09**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

PERSONAL MENTION

L. G. Tighe, Assistant General Manager at Akron, Heads C. E. R. A.

Lawrence G. Tighe was elected president of the Central Electric Railway Association at a meeting held in Cleveland on Jan. 24. He is a director and assistant general manager of the Northern Ohio Power & Light Company, Akron, Ohio, with which he has been connected since 1916. He went from the Consumers Power Company in Michigan to Akron as general superintendent of production and distribution of the light and power division of the company. At that time the system in Akron was in a run-down condition. The equipment was not in good shape



L. G. Tighe

and the service was decidedly unsatisfactory. Mr. Tighe made a careful survey of the situation, and worked out methods whereby the system was gradually brought up to its present state of efficiency. In recognition of that work, he was made assistant general manager of the company in January, 1925.

Mr. Tighe was elected to the board of directors of the company at Akron in 1929 to take the place of Charles Currie, who died a short time before. Since his elevation to the position of assistant general manager, he has taken over the major part of the details connected with the operation of both the light and power division and the transportation division of the company.

The new president of the Central Electric Railway Association was born in Saratoga Springs, N. Y., on Oct. 10, 1886. He attended school in Schenectady but during the summer months he lived on his grandfather's farm near Saratoga. There he harbored the notion that he would like to become a real farmer. A few years in school aroused his interest in electricity with a consequent subjugation of the impulse to farm it. When he finished school, he secured employment in the works of the General Electric Company at Schenectady. He stuck to the business and studied nights. In a few years the company sent him to its branch in Detroit where he remained several years and was then promoted to a position in the Jackson, Mich., plant. He remained with the General Electric Company until 1913 when he became connected with the Consumers Power Company in Jackson, controlled by Hodenpyl, Hardy & Company.

Mr. Tighe is nothing if not persistent. He has never put the farm idea completely out of his mind. So far, however, the nearest he has come to his original desire to become a farmer is to become the owner of some three acres of land just outside the city limits of Akron. There he has his home. He is very much interested in making this country place attractive and is a grower of flowers and shrubs. His chief recreational diversion is golf. He is a member of the Elks, Fairlawn Golf, City and Kiwanis clubs. He is fond of music and has a reasonably good voice. He is known as a "bear for work" and is happiest when he is engrossed in analysing a knotty problem.

✦

F. H. Dohany on Detroit Commission

Additional changes are announced in the personnel of the Detroit Street Railway Commission, charged with the responsibility of operating Detroit's municipal street railway and bus lines. John J. Gorman has resigned from the commission and Frank H. Dohany has been appointed by Mayor Bowles to succeed him. Two months ago G. Ogden Ellis resigned as president of the commission. Commissioner John J. Barlum succeeded him in that post. It is expected that Frank Couzens, successor on the board to Mr. Ellis, will be made vice-president of that body.

Mr. Gorman was appointed during the administration of John W. Smith. In a formal letter to the Mayor, Mr. Gorman said that he wished to give up his commissionship last fall, but at the time Mr. Barlum, now president of the body, urged him to remain until the new Mayor took office. When he accepted the appointment 2½ years ago Mr. Gorman had just retired from active business and, having no immediate plans, welcomed the opportunity of rendering a public service. However, in the past year his mortgage banking business has grown to such proportions that it now requires all his time and attention. It will be recalled that last fall he presented a definite plan for the creation of a crosstown elevated highway over the right-of-way of the railroads.

In addition to conducting an active law practice, Mr. Dohany, the new member of the commission, is a director of the American State Bank, a director and vice-president of the American Fort Street Company and president of the Southington Woods Company. He was born in Southfield, Oakland County, 55 years ago. He acquired his education at the state normal school at Ypsilanti and the Detroit College of Law. He was admitted to the bar in 1895.

G. W. Jones in Important Post in Brooklyn

George W. Jones, who has been vice-president of the Brooklyn & Queens Transit Corporation since July 1, 1929, and who, prior to that time, was vice-president and treasurer of the Brooklyn City Railroad, was appointed vice-president also of the Brooklyn-Manhattan Transit Corporation, the New York Rapid Transit Corporation and the Williamsburgh Power Plant Corporation, on Jan. 1, 1930. As indicated briefly in the ELECTRIC RAILWAY JOURNAL previously Mr. Jones will have charge of all contracts for materials and supplies for the four companies and will have direct charge of the purchasing department.

Mr. Jones is a veteran of the Spanish-American War and after the war was connected with the Department of the Interior of the Insular Government of Porto Rico for nine years. This department had charge of all public utilities, public lands, public buildings, public roads and the telegraph system.



G. W. Jones

During his last two years on the island, Mr. Jones was assistant commissioner of the interior for Porto Rico.

After returning to the United States, Mr. Jones was a member of the staff of the J. G. White Company for several years. Subsequently he joined the engineering firm of Sanderson & Porter. When the Brooklyn City Railroad resumed independent operation on Oct. 19, 1919, Mr. Jones was elected treasurer and five years later was also made vice-president. On July 1, 1929, he became vice-president of the Brooklyn & Queens Transit Corporation at the consolidation of the various B.-M.T. surface operating companies and the Brooklyn City Railroad into the Brooklyn & Queens Transit Corporation.

✦

Added Responsibility for H. W. Godfrey With P.R.T.

H. W. Godfrey, superintendent of instruction of the Surface Lines of the Philadelphia Rapid Transit Company, Philadelphia, Pa., has been appointed acting superintendent of instruction of the surface lines, buses and cabs, reporting to R. F. Tyson, vice-president.

F. G. Suria has been appointed assistant superintendent of instruction. The following chief instructors will be continued: J. W. Hall, chief instructor for the surface lines. F. Humphreys, chief instructor for the buses, S. Edwards, chief instructor for the cabs.

Miss Caroline Hein Secretary in Cincinnati

Miss Caroline Hein has been elected secretary of the Cincinnati Street Railway, Cincinnati, Ohio, to succeed Joseph Nicholson, who died on Nov. 19, 1929. Miss Hein started her railway career in December, 1917, as secretary to Walter A. Draper when he was vice-president of the Cincinnati Traction Company. A few years later she was made assistant secretary of that company and of the Ohio Traction Company.

When the Cincinnati Street Railway took over the operation of the street cars in Cincinnati in November, 1925, Miss Hein was retained as assistant secretary of the reorganized operating company. She served in that position up to her present promotion. She also acted as librarian for the railway and has established one of the best industrial libraries in Cincinnati.

✦

F. P. Royce Retires from Stone & Webster

Frederick P. Royce is retiring as a vice-president of Stone & Webster, Inc., Boston. For the past two years Mr. Royce has devoted his time and attention to executive matters, financial problems and special studies for Stone & Webster, Inc. During 1919, in connection with Stone & Webster activities in the railway situation in New York, he acted as general manager for the receiver of the Brooklyn Rapid Transit Company, since succeeded by the Brooklyn - Manhattan Transit Corporation, and assisted in examining the situation on the Interborough Rapid Transit Company and advising about it. On Jan. 1, 1920, he became a partner in Stone & Webster in general charge of the securities division and for a year or more continued in advisory work in connection with the railway situation in New York. When Stone & Webster was incorporated, July 1, 1920, Mr. Royce became vice-president and continued in charge of the securities division until the firm of Stone & Webster & Blodgett was incorporated in January, 1927.

Mr. Royce became associated with Stone & Webster in 1909, acting first as division manager in the Management Association in charge of some of the New England companies, and shortly afterwards as vice-president of the management division, continuing with the New England companies, also the Minneapolis company, the two Houghton companies, and Paducah. He was also actively engaged in the development of new business.

Howard L. Rogers and Frederick S. Pratt also are retiring as vice-presidents of Stone & Webster, Inc.

✦

C. M. Shelter Heads Stark Electric

Curtis M. Shetler, Canton, Ohio, general counsel for the Suburban Light & Power Company and the Utilities Service Corporation, has been elected president of the Stark Electric Railroad. Mr. Shetler succeeds W. E. Davis, who has retired from the directorate of the company. Other officers are Everett W. Sweezy, vice-president; C. E. Sperow, vice-president and general manager; O. K. Ayers, treasurer and assistant general manager and W. H. Grimes, secretary and auditor. At the same time the appointment of Mr. Ayers as district manager for the Alliance division of the Suburban Light & Power Company was made public. He succeeds C. A. Thomas, chief engineer, who will devote his entire time to engineering work.

The Stark Electric Railroad, a branch of the Utilities Service Corporation, operates between Canton and Salem, a distance of 35 miles. Headquarters are in Alliance.

✦

J. C. Newman Way Engineer at Richmond

J. C. Newman was transferred from Norfolk to Richmond on Jan. 1, as engineer of maintenance of way for the Virginia Electric & Power Company. Mr. Newman has been in charge of track maintenance on the Norfolk properties for several years.



J. C. Newman

Before coming to Virginia, he was engaged for three years by the Public Service Commission of New York, being in charge of track alignment and grades on the construction of rapid transit lines in New York City .

He is a native Kentuckian and was graduated from the University of Kentucky. After finishing school, he was with an oil company in Illinois for a short while and later was engaged on special work design for the Lorain Steel Company at Johnstown, Pa.

✦

W. A. Robertson Appointed to Fort Worth

W. A. Robertson, general superintendent of the Jacksonville Traction Company, Jacksonville, Fla., has been made general superintendent of the Northern Texas Traction Company at Fort Worth, Tex. Mr. Robertson went to Jacksonville 5 years ago from Beaumont, Tex., where he was superintendent of railways for the Eastern Texas Electric Company. Prior to his work in Beaumont, he was superintendent of transportation for the Galveston-Houston Electric Company, operating an interurban between Galveston and Houston. Eight years before becoming connected with the interurban, he was employed by the Houston Electric Company, in various capacities. He has been connected with companies operated by Stone & Webster, Inc., for nearly twenty years.

Messrs. Burch and McWethy Consulting Engineers

Edward P. Burch, for many years a consulting engineer of Minneapolis, and Harold E. McWethy, for the past three years valuation engineer of the Twin City Rapid Transit Company of Minneapolis, have become associated as consultants and analysts with offices in the Foshay Tower in Minneapolis.

Mr. Burch has been engaged for more than 30 years as consultant for many railways, railroads, and power companies, on operation, valuation and consolidation questions, and in rate cases, at Minneapolis, Seattle and Everett, Detroit, and Cleveland. He is a director of the Minneapolis, Northfield & Southern Railway, and the receiver of the Minneapolis, Anoka & Cuyuna Range Railway. His book, "Electric Traction for Railway Trains," has been used as a text and reference work in many universities.

Mr. McWethy has had a broad experience in public utility valuation and statistical research. Following his graduation from the University of Wisconsin Engineering College in 1909, he spent two years as an apprentice with the Westinghouse Electric & Manufacturing Company. The next nine years he served as valuation engineer and case investigator for the Railroad Commission of Wisconsin. Then followed two years of public utility valuation work in Nashville, Philadelphia, and in the state of Mississippi, and four years as street railway engineer of the Minnesota Railroad and Warehouse Commission before he became valuation engineer for the Twin City properties.

✦

Henry Bucher in Charge of Midland Properties

Announcement has been made by Robert M. Feustel, executive head of the Midland United Company, that the operation of the railway properties in Indiana controlled by that company would be co-ordinated under Henry Bucher, Fort Wayne, as general railway executive. The company operates power, light, railway and gas utilities in northern Indiana, particularly in the eastern section of the state.

Mr. Bucher has been railway manager of the Indiana Service Corporation for the last six years. He also had been manager of the Fort Wayne division of the Indiana Service Corporation. Mr. Bucher's office will be in Indianapolis. The position of division manager will be filled by H. E. Vordermark, who has been treasurer of the Indiana Service Corporation for many years and who for the last few years also has been vice-president.

If the petition of the Insull-controlled Central Indiana Power Company for a merger with the Terre Haute, Indianapolis & Eastern Traction Company and the Terre Haute Traction & Light Company should be approved by the Indiana Public Service Commission, the direction of all the railways would be under the divisional management of Mr. Bucher.

The Midland Company, an Insull holding company operating extensive properties in Indiana, also has made bids with bondholders for the purchase of control of the Union Traction Company of Indiana, now in receivership.

E. K. Miles in Charge in Syracuse

Earl K. Miles has mounted the business ladder from motorman to general manager of the Syracuse lines of the New York State Railways, to which post he was named on Dec. 23, at the same time that B. E. Tilton, vice-president and general manager of the system, was elected president of the company. Mr. Miles attended school at Adams and later at Albany Business College. His first real job was as a motorman in Syracuse. In 1916 he left the railway to become a mail clerk. On Jan. 1, 1919, he returned to the railway. The second step upward came in June, 1922, when he was appointed division superintendent of the Tallman division. Three years later he was made assistant to the general superintendent and shortly thereafter was made superintendent of transportation.

✦

Jim Malone Assistant to A. D. McWhorter in Memphis

Jim Malone—no one in Memphis would think of calling him anything else—has been appointed assistant to A. D. McWhorter in directing transportation of the Memphis Street Railway, Memphis, Tenn. This step is a distinct promotion for Jim, and comes in acknowledgment of his capable work during the period that he has been associated with the office of Mr. McWhorter.

Mr. McWhorter says that Jim knows every angle of street railway transportation by experience. He also emphasized Jim's dependability at doing every job, large or small, committed to him. As general superintendent Mr. McWhorter has charge of two other departments besides transportation. Jim's duties, however, are as assistant to the transportation department.

Jim became connected with the company on Feb. 13, 1921, as traffic checker in the schedule department and has worked there in different capacities since that time. After completing a course in the Memphis Law School at night, he passed his bar examinations in June, 1929.

This fall when instructors for the men were being chosen to conduct educational classes, Jim was selected as one of them and in this work he has demonstrated his faithfulness and ability.

✦

B. F. Braheney Elected Vice-President

Bernard F. Braheney, elected vice-president in charge of accounting of the Byllesby Engineering Management Corporation, Chicago, Ill., has been with the Byllesby organization since 1910. He started as a clerk in the auditing department of the Northern States Power Company at Stillwater, Minn. During the latter part of 1910 and 1911 he served as bookkeeper of the South St. Paul office and the White Bear, Minn., office of the Northern States Power Company. In 1912 he was paymaster of the Appalachian Power Company at Bluefield, W. Va., and later in the year was bookkeeper of the Louisville Gas & Electric Company.

In 1913 Mr. Braheney was made accountant of the Minneapolis General Electric Company in the Northern States Power Company system, and in 1915 he became traveling auditor of the company. In 1915 he was appointed assistant general auditor of the Northern States Power Company, which position he held until 1920 when he was made assistant general auditor of the Byllesby Engineering & Management Corporation with headquarters in Chicago. Since 1923 he has been general auditor of the company.

✦

F. K. Baker in Important State Post in West

Fred K. Baker, Everett, Wash., is the newly appointed head of the Department of Public Works for the state of Washington. This body regulates bus transportation as well as motor freight in that state, grants all certificates, passes on transfers and extensions, and makes rulings which have an important bearing on the industry. Mr. Baker has served since last August as supervisor of transportation, but late in December gave up that post, and upon the resignation of Judge Denney, who was then director, Mr. Baker was appointed to that post.

✦

Charles F. Scott Awarded the Edison Medal

The Edison Medal of the American Institute of Electrical Engineers has been awarded to Prof. Charles F. Scott, New Haven, Conn., "for his contributions to the science and art of polyphase transmission of electrical energy."

The Edison Medal was founded by associates and friends of Thomas A. Edison, and is awarded annually for "meritorious achievement in electrical science, electrical engineering, or the electrical arts," by a committee consisting of 24 members of the American Institute of Electrical Engineers.

Charles F. Scott is professor of electrical engineering at Yale University. He was born at Athens, Ohio, on Sept. 19, 1864. He was educated at Ohio University in Athens, the Ohio State University, Columbus, from which he graduated in 1885, and Johns Hopkins University, where he engaged in graduate study for more than a year.

✦

H. O. Crews in New Post

Halbert O. Crews, for seven years director of public relations for the Chicago Surface Lines, was recently appointed public administrator for Cook County by Governor Emmerson. He was sworn in on Jan. 24 and at once assumed charge of the office. Before his association with the Chicago Surface Lines, Mr. Crews was managing editor of a paper in Springfield, Ill. He was also at one time superintendent of departmental reports under Governor Lowden of Illinois.

✦

W. W. Weddle Terre Haute Roadmaster

W. W. Weddle, formerly assistant roadmaster of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., was promoted on Jan. 7 to the position of roadmaster. He succeeded John O'Laughlin, deceased. Mr. Weddle started work with the Terre Haute, Indianapolis & Eastern Traction Company as a section laborer in 1907. He was made foreman in 1912, supervisor in 1921 and assistant roadmaster in 1924.

✦

L. H. Seagrave Chairman of United States Electric Power

Louis H. Seagrave, chairman of the board of the United States Electric Power Corporation, has been elected chairman of the board of the Standard Power & Light Corporation, which will control the Standard Gas & Electric Company. Victor Emanuel, president of United States Electric Power, has been elected president of Standard Power & Light. John J. O'Brien continues as president of Standard Gas & Electric. No changes will be made in the officers of the latter company, whose stockholders also have approved the reorganization plan announced at the end of last year.

✦

J. I. Foster in New Memphis Post

J. I. Foster, for several years superintendent of transportation with the Memphis Street Railway, Memphis, Tenn., has been appointed to direct the work of the welfare department, just established to provide a means by which the company may manifest its interest in the welfare of all employees.

Mr. Foster knows more employees probably than any other official of the organization. He has given much of his time in the past to visiting the homes where sickness or distress have come.

The company management considers the work so important and his own fitness for it so apt, that his transfer to it is to be regarded in the light of a promotion.

Mr. Foster began his railway career in Chattanooga in 1883. In 1900 when the Memphis company desired to secure an active, dependable man to assist the general superintendent, Mr. Foster was recommended, and he came to Memphis at that time as the assistant to Frank Smith.

✦

R. B. Stearns Massachusetts Northeastern Receiver

Federal Judge Brewster has appointed Robert B. Stearns of Boston receiver for the Massachusetts Northeastern Street Railway, Haverhill, Mass., operating more than 100 miles of electric railway. He was bonded for $35,000. Mr. Stearns was formerly vice-president, general manager and treasurer of the Eastern Massachusetts Street Railway, from which he withdrew as an officer in January, 1929, after more than ten years of service with the company.

✦

E. A. Mitchell, formerly in charge of taxicab inspection in the Public Utilities Department, has been appointed senior street railway inspector, and assistant to George B. Avery, superintendent of public utilities, Seattle, Wash.

✦

W. L. O'Brien has been appointed superintendent of transportation and traffic of the Rochester, Lockport & Buffalo Railway, Rochester, N. Y., succeeding A. Blaine Miles, resigned. R. W. Travisee has been appointed assistant superintendent of transportation and traffic, succeeding W. L. O'Brien, promoted.

OBITUARY

A. T. Spencer

Albert T. Spencer, general superintendent of construction and maintenance, Montreal Tramways, died at his home on Jan. 26. He had been ill about two months.

Probably the best-known way engineer in Canada, Mr. Spencer had made a reputation for himself that was international. He had held his position in Montreal since December, 1926, having come to it from the post of assistant to the general manager of the Toronto Transportation Commission. In May, 1921, he had accepted the important position of engineer of way of the Toronto Transportation Commission in anticipation of the extensive program of track rehabilitation which began when the commission took over the street railway lines of Toronto the following September. Under his direction about



A. T. Spencer

200 miles of track was rebuilt according to the most modern standards, and considerable new track was laid. The work was done in a surprisingly short time, largely because Mr. Spencer made use of the latest types of construction machinery and resorted to many novel methods.

Following the completion of the rehabilitation program, Mr. Spencer was made assistant to the general manager of the Toronto Transportation Commission in May, 1924, continuing in that position until his return to Montreal at the end of 1926.

Mr. Spencer's engineering career began in 1900 with the Dominion Coal Company at Glace Bay, N. S., where he was engaged in general construction, mining and railway work. He was field engineer with the Canadian Pacific Railway from 1903 to 1905, and until 1906 was chief of party. In 1906 he entered the employ of the Montreal Street Railway as engineer of survey, location and construction of certain projected suburban electric lines. Following the completion of this assignment he began regular work on the staff of the company and its successor, the Montreal Tramways, serving as assistant engineer in charge of maintenance of way. He left Montreal in January, 1921, to go with the Hydro-Electric Power Commission of Ontario as assistant engineer in the railway department. There he remained until his connection with the Toronto Transportation Commission later in the same year.

For many years Mr. Spencer was active in the American Electric Railway Engineering Association. At the time of his death he was a member of the standing committee on way and structures and of the committee on nominations. He did much research on the use of special steels in trackwork and on methods of hardening rail. He was an associate member of the Engineering Institute of Canada, a member of the Association of Professional Engineers of Quebec, a member of the Association of Professional Engineers of Ontario and a member of the American Society for Municipal Improvements.

✦

Maurice A. Welsh

Maurice A. Welsh, superintendent and traffic manager of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, died at the Chicago Memorial Hospital, Chicago, Ill., on Jan. 18.

Mr. Welsh's railroad service combined hard work and outstanding ability in a very unusual degree. To his originality he coupled force and energy, being persistent to translate his ideas into action. His ability to make and retain the friendship of all who knew him was evidence of his sincerity, good faith and unfailing geniality. He was unswervingly loyal to his railroad and to his superiors. He was fair to the public and never too busy to give intelligent and sympathetic consideration to every complaint. Above all, he tempered justice to his associates with real friendliness, so that he held the respect of all who worked under him.

Mr. Welsh was born at Iron River, Mich., on March 4, 1887. He entered the service of the Illinois Central Railroad in 1903 as special agent, in which capacity he was employed until early in 1910, when he resigned to enter the Police Department of the city of Waterloo. In 1911 he accepted the position of special agent with the Waterloo, Cedar Falls & Northern Railway. On March 1, 1917, he was promoted to be superintendent with jurisdiction over the operating and claims departments, and on Dec. 20, 1922, his jurisdiction was extended to the traffic department with the title of superintendent and traffic manager.

✦

H. C. Higgins

Henry C. Higgins, who helped to build many electric railways in Iowa, Wisconsin and Illinois in his six decades of activity as a public utilities engineer, died on Jan. 22 in Centralia, Ill., where he had resided for the past 23 years. Mr. Higgins began his career as a contractor on the Baltimore & Ohio Railroad's western lines at the age of 21 years, but afterward confined himself to the utility field. His last important executive positions were as manager of the Sterling, Dixon & Eastern Electric Railway and manager of the Lee County Lighting Company at Dixon, Ill. He was part owner and an executive of these companies from the time of their inception until July, 1907, when he retired from active business.

Julius Theobald

Julius Theobald, general manager of the Springfield Railway, Springfield, Ohio, died at his home in that city on Jan. 15, following an illness of three months. Mr. Theobald was born in Columbus 54 years ago. He attended high school there and later went to Ohio State University from which he was graduated. He entered the utility field after finishing his college work, and his ability as a leader and executive was soon recognized. After a series of promotions he accepted a position as superintendent of the Atlantic City Electric Light Company. Two years ago he went to Springfield to become general manager of the Springfield Railway.

✦

James A. Duffy

James A. Duffy, superintendent of equipment for the Monongahela-West Penn Public Service Company, Fairmont, W. Va., for ten years, died on Jan. 1. Mr. Duffy was born at West Newton, Pa., 57 years ago. In his early manhood he moved with his family to Pittsburgh and there he was located for many years. He was employed with the Duquesne Traction Company and the Fifth Avenue Traction Company in Pittsburgh, later with the Pittsburgh Railways. From Pittsburgh Mr. Duffy went to Havana, Cuba, with the Greenwood Engineering Company, and was for some time engaged there in construction work as chief engineer, and he was also with the Havana Electric Railway in Cuba. On his return to Pittsburgh from Cuba, Mr. Duffy became master mechanic with the Pittsburgh Railways. He was also master mechanic of the Penn-Ohio System for seven years.

✦

John O'Laughlin

John O'Laughlin, roadmaster for the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., died on Jan. 2. Mr. O'Laughlin was 75 years old. He started in railroad work as a water boy. He helped to build the present lines of the Erie Railroad in New York State and was with the Erie for many years. Following this he served on the Ann Arbor Railroad for some time, but in 1912 joined the Terre Haute, Indianapolis & Eastern Traction Company as roadmaster. He had been a member of the Roadmasters and Maintenance of Way Association of America since 1887.

✦

Charles A. Lux, a founder of the Rochester, Syracuse & Eastern Railway, Syracuse, N. Y., died in that city on Jan. 22. He was 70 years old. With William P. Gannon, Mr. Lux organized the electric railway, which began operation in 1905. He also helped build other interurban lines in central New York. Later he entered the water power field. His holdings on the Salmon River were sold to the Niagara, Lockport & Ontario Power Corporation.

✦

John B. Leighton, who served as claims adjuster for the San Francisco Municipal Railway System, San Francisco, Cal., from 1913 to 1926, died in that city Jan. 20 at the age of 73. Mr. Leighton was a pioneer street railway man of San Francisco. He served for many years as secretary of the old Presidio & Ferries Railroad, which in 1913 was absorbed by the Municipal System.

INDUSTRY MARKET AND TRADE NEWS

Heavy Stocks of Materials Necessary to Insure Uninterrupted Service

In order to maintain continuous and uninterrupted service on its street railway and motor bus lines which serve the greater part of Connecticut, the Connecticut Company is obliged to carry in stock in its carhouses and other storage facilities, more than 10,000 different parts and items of equipment and a number of different kinds of each. To keep this stock on hand at all times requires a continuous investment of more than $1,000,000, but the amount is necessary if the effects of wear and tear on equipment are to be offset by rapid repairs and replacements.

Chief among the items of stock carried are rails, ties, poles and trolley wire, about 100,000 ties being required each year for renewal to insure safety and riding comfort.

In the course of a year the company has to replace some 7,500 panes of car window glass, while the preservation of the appearance of its rolling equipment requires the use of about 10,000 gal. of paint and varnish. About 17,000 lb. of heavy grease and 20,000 gal. of oil are needed for lubrication. The number of electric lights burnt out and replaced on the company's equipment during a year would care for the renewals of 4,500 families, while the trolley pole rope would have furnished each family with a clothes line and each could be furnished with a new broom from the stock of the latter required in cleaning the cars.

To Hasten Work on New Subway

The Board of Transportation of the city of New York will hold a public hearing on Feb. 10 on the proposed new Second Avenue trunk-line subway route linking new rapid transit lines in the easterly part of the Bronx with another new rapid transit network in Brooklyn and Queens. The hearing will be one of a series to be held between Feb. 6 and March 19 in the board's offices at 250 Hudson Street on the 100 miles of proposed new subway routes included in the $800,000,000 project announced on Sept. 16 as the second stage of the city's subway construction program.

The Board of Transportation plans to submit definite routes to the Board of Estimate for approval this summer and expects to award about $25,000,000 in construction contracts by fall so that work may be started during 1930. The routes as outlined in the tentative program announced on Sept. 16 call for 294 miles of track and the bare construction cost, exclusive of financing charges, equipment, power and other items, is estimated at $438,000,000.

British Get Part of Buenos Aires Subway Car Order

Ira W. McConnell, first vice-president of Dwight P. Robinson & Company, Inc., New York, says that not all the equipment of the Buenos Aires subway will be of British manufacture. Mr. McConnell said: "We placed an order with a British firm for 56 cars. The reason for placing the order abroad lay in the fact that we were able to obtain the cars for 15 per cent less from British manufacturers. The entire order amounts to approximately $1,000,000. The special equipment, or most of it, is being purchased from firms in the United States.

"United States trade is maintaining its own in Argentina and home manufacturers who can prove the merit of their product are showing gains. Where there is a decided difference in price, of course, the purchasers buy abroad."

Smaller Capacities Feature Recent Bus Orders

Conspicuous among bus deliveries made during the past few weeks have been the number of units of from 18- to 23-passenger capacity, numbers of which are being ordered for de luxe and semi-de luxe service on city and intercity routes The United Traction Company, of Albany, N. Y., has added three White Model 65 buses to its already extensive fleet, while the Denver Tramway Com-

Use of Aluminum Alloys Reduces Weight of New Cars of British Columbia Electric Railway

Additional details of the fifteen trolley cars recently delivered to the British Columbia Electric Railway by the Canadian Car & Foundry Company for service in Vancouver are now available. The cars, which are of the one-man two-man, single-end, double-truck type, embody certain features of structure and design which are rather unusual. Underframes consist of pressed-steel shapes and rolled-steel sections, with built-up body bolster, consisting of open hearth steel plates and cast-steel fillers. Sideframes consist of rolled-steel 3-in. by 2-in. angle side sills, tee bar posts, rolled-steel belt rails, rolled-steel angle side plates, grade 17 Duralumin side girders, with the same grade of material for letter boards.

Floors consist of two thicknesses—lower floor $\frac{7}{8}$ in. thick and top floor of $\frac{5}{8}$-in. maple, with mats laid at standing spaces. Between the floors is laid a hot waterproof composition to deaden sound. Floors are screwed and nailed to stringers which are bolted to steel members in underframe. Roofs are of plain arch design, reinforced by rolled-steel carlines and steel frame bulkheads at each body end. Roof boards are tongue and groove, covered with cotton duck, laid in white lead. Trucks are of the latest design of the Canadian Car & Foundry Company, built for standard gage, with wheelbase of 5 ft. 4 in. They are equipped with a graduated spring system, said to make for easy riding qualities, and are built with particular attention to the elimination of noise. Complete weight of body and trucks is given as 39,000 lb., and the builder estimates a saving of 1,200 lb. through the use of Duralumin. Additional details of the equipment of these cars were supplied in the Annual Statistical Number of ELECTRIC RAILWAY JOURNAL, issued January, 1930, page 63.



Rear section of Vancouver cars is equipped with upholstered forward-facing seats, while forward section, with longitudinal seats, provides ample standing capacity

When used for two-man operation both forward doors are used for entrance, with the center and rear doors, which are provided with treadles, for exits. The section of the car forward of the center door is used as a loading reservoir, the passengers paying only as they pass to the rear to take the cross seats or to leave the car. When used for one-man operation the forward section of the forward door, nearest the operator, is used for an entrance, the other section of the forward door, as well as the center and rear doors, being used for exit. If desired, the center door can be locked, in which case the rear door and the second section of the forward door would be used as exits.



Side elevation of cars recently delivered to the British Columbia Electric Railway, showing unusual arrangement of exit doors

pany and the Pittsburgh Motor Coach Company have taken one and two, respectively, of this type. Among buses of larger type to be noted in recent deliveries are five White Model 54 buses to the Omaha & Council Bluffs Street Railway, for co-ordinated service in connection with its rerouted street railway service, two buses of the same type for the Baltimore Coach Company, and one for the Cumberland & Westernport Transit Company, of Frostburg, Md. This same company has also taken delivery of a Type Z 39-passenger Yellow coach. Los Angeles Railway has received three White Model 54 buses and one Model 54A from the same manufacturer. Two White buses of large capacity have recently been placed in service by a subsidiary of the Grays Harbor Railway & Light Company between the cities of Hoquiam and Aberdeen, Wash.

Recent deliveries by the Mack-International Motor Truck Corporation include one Mack Model BB four-cylinder 177-in. chassis to the Peoples Motor Coach Company, of Indianapolis; two Model BC six-cylinder 33-passenger city type buses to the Hamburg Railway, Hamburg, N. Y.; and five Model BC six-cylinder 20-passenger buses to the Durham Public Service Company, of Durham, N. C.

American Car & Foundries Motor Company has delivered two A.C.F. 23-passenger street car type coaches to the Stockton Electric Railway, Stockton, Cal., and four all-steel 40-passenger gas-electric metropolitan type coaches to the Boston Elevated Railway. General Motors Truck Company reports delivery of one Type W city-service bus to the Erie Railway, Erie, Pa.; three Type Z 29-passenger buses to the Louisville Railway; two Type W city-service buses to the Oklahoma Railway, Oklahoma City; five Type W observation coaches to the Milwaukee Electric Railway & Light Company; and nine Type Z buses to Public Service Co-ordinated Transport.

Linde Oxygen Plant for Portland, Ore.

The Linde Air Products Company announces the opening of an oxygen plant at 60 Knott Street, Portland, Ore.

This plant, which started operations on Nov. 19, 1929, is located on a private siding on the Oregon Washington Railroad.

A. D. Davis is superintendent of the plant and D. F. Fox, whose headquarters are at 114 Sansome Street, San Francisco, Cal., is district superintendent.

R. G. Daggett, with headquarters at the same address, is division superintendent.

✦

Brooklyn Surface Lines to Be Rerouted

Plans to reroute surface lines in downtown Brooklyn at a cost of approximately $100,000 were announced recently by William S. Menden, president of the Brooklyn-Manhattan Transit Corporation, at a luncheon of the Downtown Brooklyn Association, at which transportation leaders and representative business men met to discuss the downtown district's transportation and traffic needs.

Mr. Menden said that work on the installation of new curves and switches would begin immediately. He said that the B.-M.T. proposed to make the expenditure of $100,000 to try out a scheme which might simplify the operation of surface cars in downtown Brooklyn by eliminating crossings and left-hand turns.

✦

Merger in Electric and Hand Lift Truck Field

A recent development of definite interest and importance to the materials handling equipment field is the linking together, in ownership and management, of Barrett-Cravens Company with Walker Vehicle Company, Chicago, and Automatic Transportation Company, Inc., Buffalo.

Walker Vehicle Company is an Insull company, being a subsidiary of Commonwealth Edison Company. It has purchased the capital stock of Barrett-Cravens Company, manufacturer of lift trucks, lift-truck platforms, portable elevators and structural steel storage racks.

The Automatic company is the pioneer manufacturer of electric industrial trucks and tractors, while Walker Vehicle Company is one of the oldest motor truck manufacturers, having been in business since 1903. It manufactures a full line of electric trucks for street use.

✦

Taft-Peirce Manufacturing Company, Woonsocket, R. I., has appointed Hal W. Reynolds direct factory representative in the Cleveland territory. Mr. Reynolds is experienced in the small tool and gage field. His headquarters will be at 1724 St. Clair Avenue, Cleveland, at which address he will carry a representative stock of Taft-Peirce products which include gages, tool room specialties, magnetic chucks and reamers. The territory embraced by the Cleveland office includes the northern half of Ohio.

✦

FitzJohn Manufacturing Company, Muskegon, Mich., maker of motor coach bodies, in completing its business for 1929 enjoyed an increase in sales of approximately 17 per cent over 1928 and one of the largest years in volume of business in the history of the company. Anticipating a further increase in 1930, the company has completed an 18,000-sq.ft. addition to its plant, bringing the total area for operating purposes to 74,000 sq.ft. In addition to business enjoyed during past years, in 1929 contact was made with the White and the Studebaker organizations and standard bodies, suitable for mounting on their various chassis, are now being manufactured.

✦

Hyatt Roller Bearing Company, Newark, N J., announces the appointment of H. K. Porter as general sales manager. He succeeds H. O. K. Meister, promoted to be assistant general manager of the Hyatt Company. During the past fourteen years Mr. Porter has held various positions on the Hyatt sales staff. He was assistant general sales manager prior to his new assignment.

✦

Eccles & Davies Machinery Company, Los Angeles, Cal., has been appointed sole California distributor for the sale of Krupp Widia Metal, an exceptionally tough high-speed steel. Stocks will be carried at Los Angeles for prompt service to patrons.

✦

Wagner Electric Corporation, St. Louis, Mo., announces the appointment of Major Elam as branch manager of the Minneapolis territory. Before the war he was power engineer of the Central Illinois Light Company of Peoria, Ill., and immediately after discharge from the army he again assumed that post. He joined the Wagner Electric Corporation in 1927 as a salesman in the St. Louis territory, from which position he was transferred to the Minneapolis office as branch manager.

ELECTRIC RAILWAY MATERIAL PRICES—FEBRUARY 1, 1930

Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.00
Lead, cents per lb.	6.25
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	5.60
Tin, Straits, cents per lb.	38.75
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	42.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.55
Somerset mine run, f.o.b. mines, net ton	1.70
Pittsburgh mine run, Pittsburgh, net ton	1.55
Franklin, Ill., screenings, f.o.b. mines	1.45
Central, Ill., screenings, f.o.b. mines	1.95
Kansas screenings, Kansas City	1.40

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive ⅞ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.075
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.90
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.35
Sheet iron (24 gage), cents per lb.	2.70
Sheet iron, galvanized (24 gage), cents per lb.	3.35
Galvanized barbed wire, cents per lb.	3.00
Galvanized wire, ordinary, cents per lb.	3.00

Waste—New York

Waste, wool, cents per lb.	14.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	11.00
Colored	10.00

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	14.4
White lead in oil (100 lb. keg), cents per lb.	14.25
Turpentine (bbl. lots), per gal.	0.59
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.15
Weatherproof wire base, cents per lb.	18.50

Paving Materials

Paving stone, granite, 5 in., f.o.b.: New York—Grade 1, per thousand	$150.
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.85
Gravel, ¾-in., cu.yd., delivered New York	3.40
Sand, cu.yd., delivered New York	2.15

Old Metals—New York and Chicago

Heavy copper, cents per lb.	14.00
Light copper, cents per lb.	11.75
Heavy yellow brass, cents per lb.	7.75
Zinc, old scrap, cents per lb.	3.00
Lead, cents per lb. (heavy)	4.00
Steel car axles, Chicago, net ton	$16.00
Cast iron car wheels, Chicago, gross ton	14.00
Rails (short), Chicago, gross ton	18.75
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	8.00



1.

Light Weight (72 lb.)

2.

Never Clog with Chain.

3.

Minimum Platform Space Required.

4.

Lowest Maintenance and Long Life.

5.

Maximum Power (3000 lb. braking pressure).

National Brake Company, Inc.

890 Ellicott Square Buffalo, N. Y.

General Sales Office:

The Ellcon Co., 50 Church St., New York

Canadian Representative:

Lyman Tube & Supply Co., Ltd., Montreal, Can.

PEACOCK STAFFLESS BRAKES

A New Seneca Street



THE NEW WYE IS A GARDEN SPOT

Seneca street is finished. Completion of repaving now provides a new structure for practically every inch of the way from Main street to the city line. Three years ago I R C took the first step in actual rehabilitation of Seneca street by reconstructing its tracks and paving from the Buffalo river to city line. Last year additional work was done in the stretch from Smith street to the Larkin viaduct, and this year I R C has completed its work by reconstructing the stretch from Peabody to Bailey and the stretch from Main to Michigan.

This leaflet is one of a series of "personal messages" from President Yungbluth of the International Railway Company to the car-riders.

IRC of Buffalo, N. Y., tells its patrons . . .

"The rails instead of being joined at the end mechanically by means of a plate and bolts are *Thermit-welded*, providing practically a continuous rail structure from one end of the line to the other.

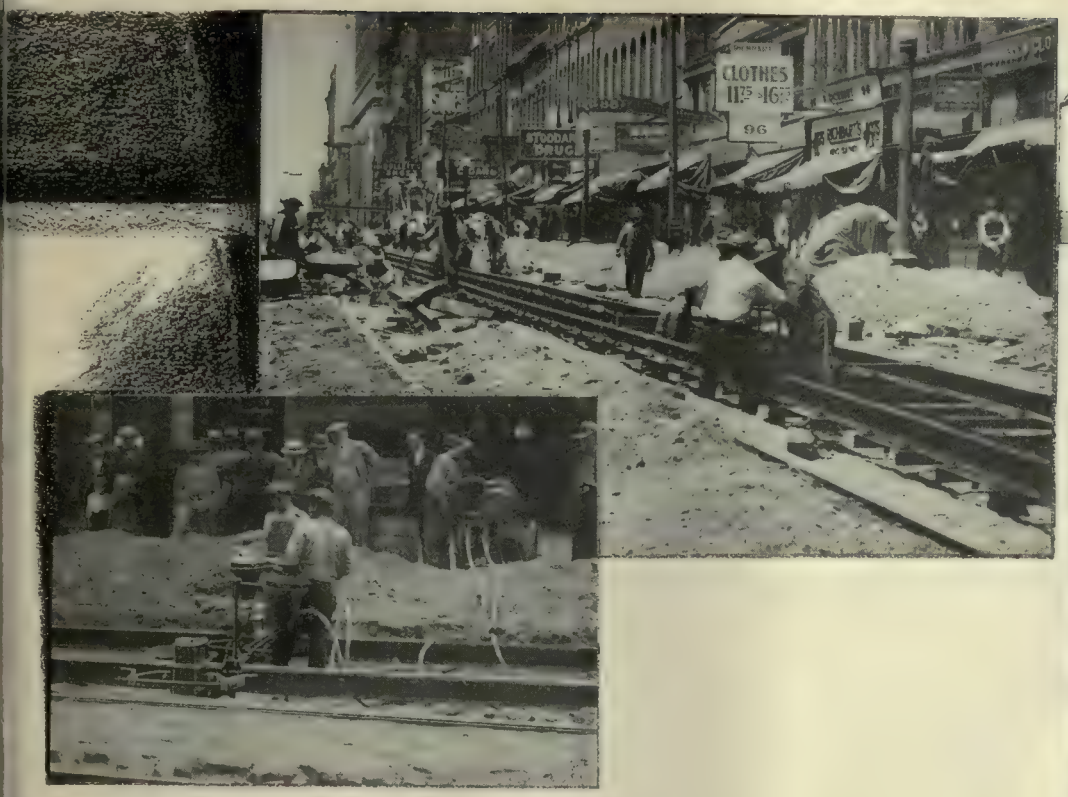
This construction makes *car riding remarkably smooth, comfortable and speedy.*"

NOTE: The italics are ours.

THERMIT

METAL & THERMIT

PITTSBURGH CHICAGO BOSTON 120 BROADWAY



WHY does the street railway management in Buffalo go out of its way to put this story before the car-riders? To advertise Thermit? Not a chance! It's to advertise *smooth, comfortable* and *speedy* transportation. That's all! The management in Buffalo has found Thermit Welding a means to an end—an end of rail joint troubles.

Rails become smooth, continuous ribbons of steel when Thermit welded. Joints are virtually eliminated. There are no gaps for wheels to jump. There are no rough spots to cause noise or vibration. Paving once laid need not be disturbed during the entire life of the rail itself.

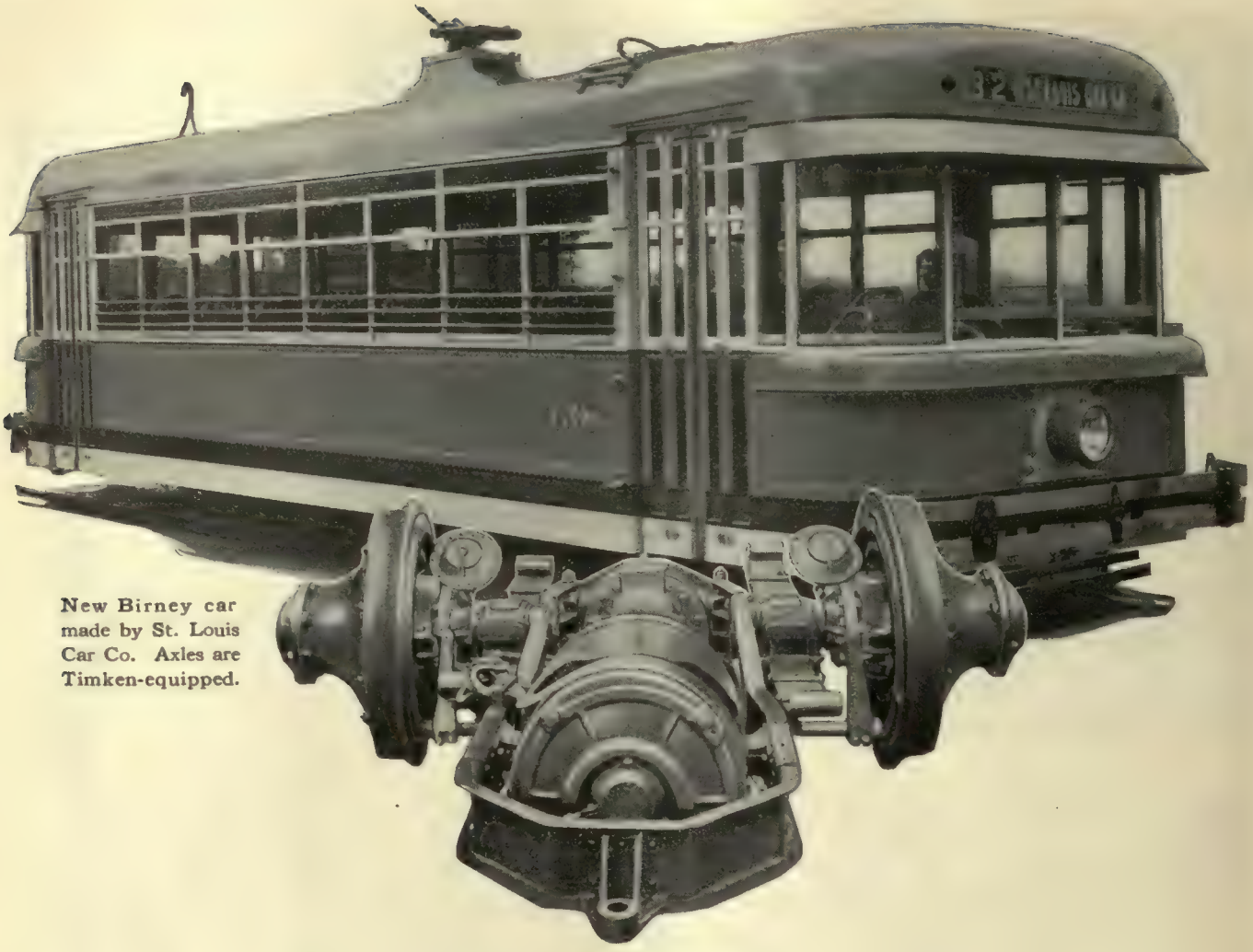
Thermit Welds being pure homogeneous steel have the same electrical conductivity as the rail. Consequently no rail bonds are used when Thermit Welds are installed.

Springtime is trackwork time!

Not only in Buffalo, but in many other cities in the U.S. and Canada, reconstruction and repair programs involving Thermit Welding—are now being prepared. Include Thermit Welding in your "estimates." Information and cost data on request.

CORPORATION

NEW YORK, N.Y. SOUTH SAN FRANCISCO TORONTO



New Birney car made by St. Louis Car Co. Axles are Timken-equipped.

Timken-equipped Journals Mean Increased Revenue

The final gesture in mechanical refinement is made with Timken Bearings. It is a fact, demonstrated in every division of the revenue transportation field, that sharp reductions in operating costs are brought about by the highly anti-friction performance of Timken Bearings under all loadings including thrust. Power consumption for starting, and charges for lubrication, maintenance, and depreciation are decreased because Timken Bearings supply load-carrying advantages in car journals never before attained in an anti-friction bearing. Every need for enduring economy in bearings is supplied by Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel—wherever wheels and shafts turn.

THE TIMKEN ROLLER BEARING COMPANY
C A N T O N , O H I O

TIMKEN *Tapered Roller* **BEARINGS**



Careful counts have proven that many more buyers of merchandise travel by electric railway car than by all other means combined. To the merchant, therefore, the electric railway car is a most important vehicle. It is even a more important vehicle if it carries the merchant's message to the people. Through Collier Service Car Cards, the merchant urges the buyers to the stores and indirectly to use the vehicle which carries most of them.

"CAR CARD ADVERTISING ALMOST EVERYWHERE"

BARRON G. COLLIER INC., CANDLER BLDG., N. Y. C.



Where Safety and Appearance Dominate

IN the heart of a busy city, where safety must be maintained at its maximum, there is nothing so important in the selection of electric line poles as the certainty of their strength and endurance. Another important factor, of course, is their appearance.

Both of these requirements are embodied in the tubular steel pole and reach their maximum effectiveness in NATIONAL Poles, because of their great strength and reliability under severe conditions of service and their clean cut, neat appearance which adds to rather than detracts from the built-up surroundings.

Wherever the factors of safety and appearance dominate, it will pay you to specify NATIONAL Poles. Made by the largest manufacturer of Tubular Products in the world, with facilities for meeting a wide range of specifications in pole construction. Ask for Bulletin No. 14—Tubular Steel Poles.

For additional protection against atmospheric corrosion use NATIONAL Copper-Steel Line Poles. Steel containing a small percentage of copper makes it more resistant to corrosion caused by alternate wet and dry conditions. The fact that tubular poles are constantly exposed to such conditions, makes the use of copper-steel particularly desirable for this purpose. Ask for Bulletin No. 11—Copper-Steel Pipe.

NATIONAL TUBE COMPANY, Pittsburgh, Pa.
Subsidiary of United States Steel Corporation





OVER 10,000 MILES PER DAY ON GOODYEARS

On the roads of Texas, Oklahoma and Arkansas, the 100 coaches of Dixie Motor Coach Corporation travel 10,780 miles per day —on Goodyear Tires.

There's a test of tire performance! Endurance, traction, long mileage soon prove themselves in such operations.

More motor coach fleets are equipped with Goodyear Tires than with any other kind. That's mighty strong evidence that it will pay you to get in touch with a Goodyear Truck Tire Service Station Dealer—and find out what his tires can do for you.

On your new coaches specify Goodyears

GOODYEAR

THE GREATEST NAME IN RUBBER

Maintaining





Temperatures of twenty degrees below zero—snow-covered, wind-driven roads—yet schedules must be maintained.

The Wisconsin Northern Transportation Company does it—maintaining a year round service between Duluth, Minnesota and Eau Claire, Wisconsin, 130,000 bus miles a year.

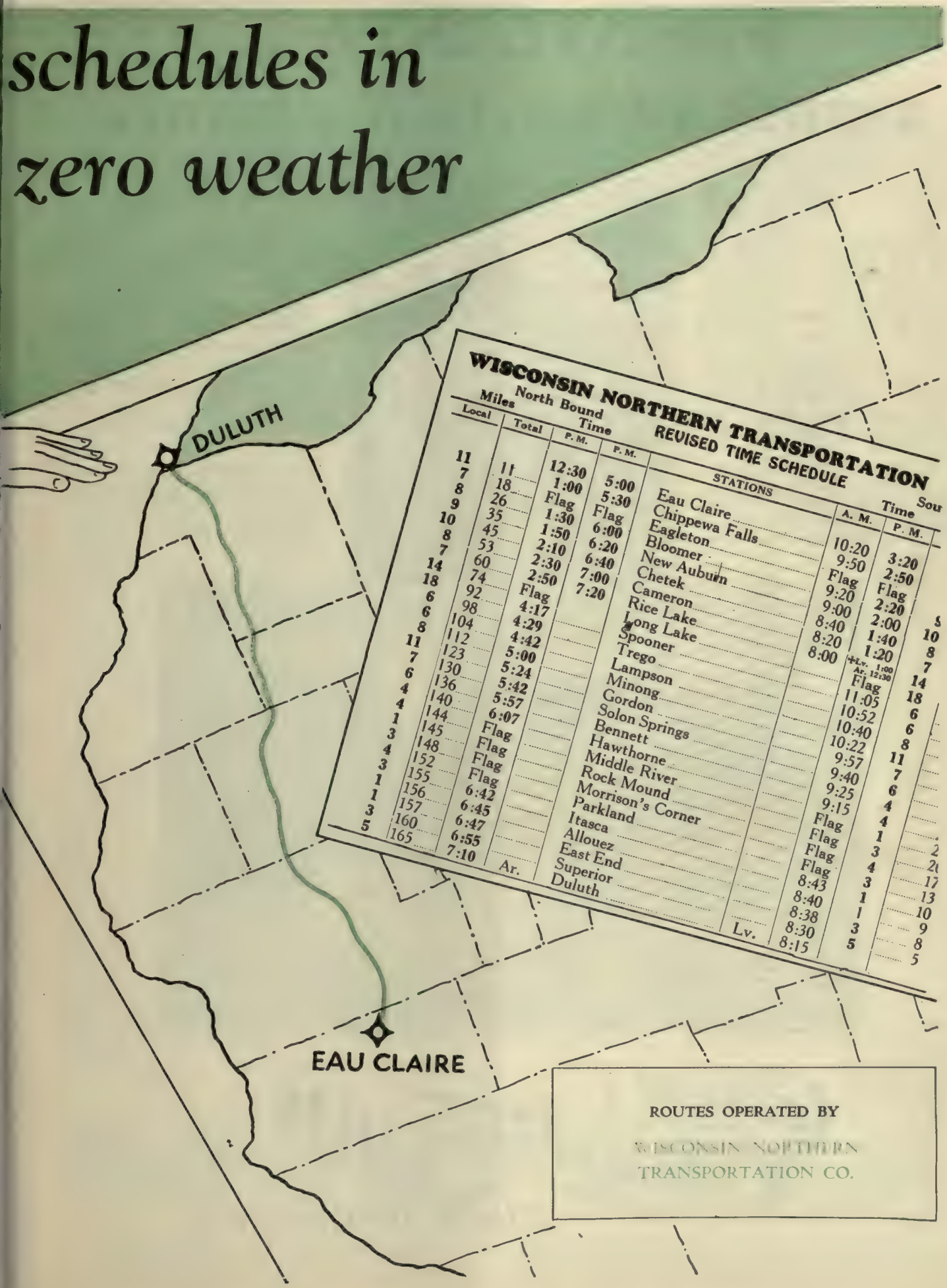
Scientific lubrication with Cities Service petroleum products, plus the use of powerful, clean burning Cities Service gasoline, makes economic operation possible even under these adverse conditions.

This same scientific Cities Service lubrication is available to bus properties throughout the country.

CITIES SERVICE COMPANY

60 Wall Street New York City

schedules in zero weather



WISCONSIN NORTHERN TRANSPORTATION
REVISED TIME SCHEDULE

Miles Local	Miles Total	North Bound Time P. M.	P. M.	STATIONS	Time A. M.	Time P. M.
		12:30	5:00	Eau Claire	10:20	3:20
11	11	1:00	5:30	Chippewa Falls	9:50	2:50
7	18	Flag	Flag	Eagleton	Flag	Flag
8	26	1:30	6:00	Bloomer	9:20	2:20
9	35	1:50	6:20	New Auburn	9:00	2:00
10	45	2:10	6:40	Chetek	8:40	1:40
8	53	2:30	7:00	Cameron	8:20	1:20
7	60	2:50	7:20	Rice Lake	8:00	Lv. 1:00 Ar. 12:30
14	74	Flag		Long Lake		Flag
18	92	4:17		Spooner		11:05
6	98	4:29		Trego		10:52
6	104	4:42		Lampson		10:40
8	112	5:00		Minong		10:22
11	123	5:24		Gordon		9:57
7	130	5:42		Solon Springs		9:40
6	136	5:57		Bennett		9:25
4	140	6:07		Hawthorne		9:15
4	144	Flag		Middle River		Flag
1	145	Flag		Rock Mound		Flag
3	148	Flag		Morrison's Corner		Flag
4	152	Flag		Parkland		Flag
3	155	6:42		Itasca		8:43
1	156	6:45		Allouez		8:40
1	157	6:47		East End		8:38
3	160	6:55		Superior		8:30
5	165	7:10	Ar.	Duluth	Lv.	8:15

ROUTES OPERATED BY

WISCONSIN NORTHERN TRANSPORTATION CO.

from ATLANTA... a study of traction advance

THE photograph shows an interesting example of the Georgia Power Company's extensive track reconstruction work in 1929. Mitchell Street, Atlanta—2,250 feet of track.

The type of construction built by Mr. C. A. Smith, Superintendent of Roadways: Concrete beams under rails; Dayton ties bent so as to require minimum amount of concrete, spaced 3 ft. center to center of ties (see photo); 80-lb. A.S.C.E. rail . . . and, of course, a stress-absorbing cushion between the rails and the concrete paving—*the Carey Elastite System of Track Insulation,* standard A, B and D sections.

A guaranty of quicker, better, smoother service and lower maintenance cost. Of course, you will want full information on this modern traction improvement. Write.



AN interesting view of the construction work of the Georgia Power Company Street Railway, on Mitchell Street, Atlanta. Note particularly the application of Carey Elastite System of Track Insulation.

Carey Elastite
REG. U.S. PAT. OFF.
TRADE MARK REG'D. U.S. PATENT OFFICE
SYSTEM OF
TRACK INSULATION

THE PHILIP CAREY COMPANY *Lockland,* CINCINNATI, OHIO



CHANGE-OVERS WITH GOODYEAR TYPE "K" RIMS

easy, rapid way to greater profits

CUT down change-overs with Goodyear Type "K" rims offer you a quick increase in profits for your trucks.

Nothing complicated—you simply cut down your old solid-equipped wheels and weld on single or dual Type "K" felloes. You get better service from your trucks; your drivers like the new power. Your repair bills are smaller, and your lay-ups shorter.

Mr. E. W. Wiedebusch, President, Builders Supplies & Fuel Co., Wheeling, W. Va., takes time enthusiastically to write: "Most pleased with this installation and results obtained. We have been able to get into places that were before impossible. Our repair bills have been smaller, and with our drivers and every one connected with our trucking department so much better satisfied, we have secured considerable new business."

Type "K" Rims are trim, clean, cool running. You can take any tire off in three minutes or less. They are safe because they stay on the tire until your repair boss says the word—then off with least loss of time.



"The Man who changes the tires likes Goodyear Type 'K' Rims"

Leading truck and bus manufacturers and users everywhere emphatically endorse Type "K" Rims. Write today to Goodyear, Akron, Ohio, or Los Angeles, California, for complete information.

GOODYEAR

TYPE "K" TRUCK AND BUS RIM EQUIPMENT



New!

. . . an important development in varnished cambric tape

SEAMLESS bias varnished cloth at the price of sewn bias! That's what a specially developed base cloth has made possible.

Price no longer need compel you to waste time and insulation in cutting out sewn seams. This new seamless bias comes in long, continuous lengths, without sewn joints. It has greater dielectric and mechanical strength than the sewn bias.

Whether it be for wrapping cable joints, for winding coils, or for any similar insulating need, you will find this new seamless bias tape ideal. It's made in either black or yellow finish, in tape form or in rolls approximately 36" wide.

Send for a sample.

Empire Oiled Insulations: Super-Micanite, and Micanite bonded mica insulation; Mica Insulating Varnishes; Compounds, Cements, Friction and Rubber Tapes are products of the Mica Insulator Company.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.

Cleveland Pittsburgh Cincinnati Birmingham Seattle San Francisco
Los Angeles Toronto Montreal *Works:* Schenectady, N. Y. London, Eng.

PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION

a.c.f.



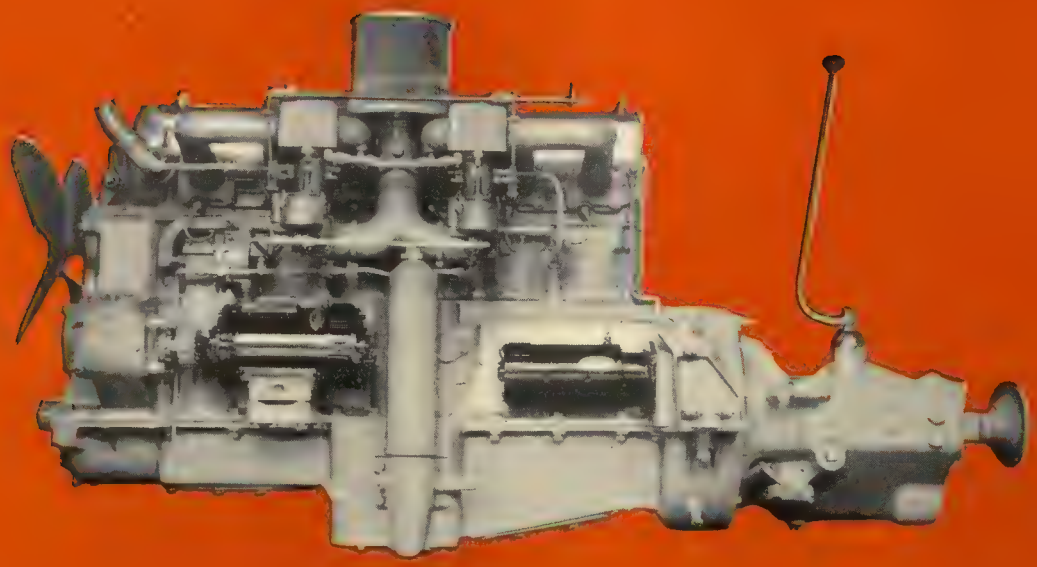
ANNOUNCING—*new* large capacity coaches —so powerful and flexible that they set the pace in present day traffic; with powerful engines that *keep* high speed schedules regardless of hills. Designed and built by a. c. f.



G. C. F. offers a series of large capacity passenger coaches that are *new*—new to G. C. F. and new to the industry. They are not simply revamped and modernized editions of models that have already existed. With no compromises, G. C. F. has brought its long experience and tremendous resources to the task of building coaches that exactly fit the needs of modern bus transportation and schedules . . . In appearance, the bodies of these new coaches are practically the



same. But one chassis is designed to meet normal requirements with a 120 h. p. Hall-Scott engine, and the other is powered with a 175 h. p. Hall-Scott for unusual operating conditions where great power or sustained high speed are required. In this way the operator may obtain the same rider-appeal and exceptional operating qualities of the truly modern coach, with the horsepower his requirements call for.



Consider these revolutionary features and specifications:

Parlor Car seating capacity: Up to 37 passengers; auxiliary seats for more. 264" wheelbase where necessary . . . Headroom: 76 inches. Inside width between liner panels: 88¾ inches. Removable lift type sash on metal guides—all windows opening all the way; each pair of seats is provided with an individual window . . . Inside metal baggage racks lined with carpet (ceiling above protected) extend full length of coach . . . Inside finish: metal panelling, including ceiling, to harmonize with color scheme selected.

The location of the transmission provides unusually roomy entrance space. Transmission, drive-line and rear axles are designed specially for coaches of this series. Chassis engineered to allow adequate "roll" without stress on springs, shackles or chassis.

Three speed transmission, possible only by flexibility of new fully balanced engine. Full floating axle with bevel gear and pinion drive; Hotchkiss drive; largest and strongest axle used in any bus.

Both the 120 h. p. and 175 h. p. Hall-Scott engines are so advanced in their performances that both actual road performance and laboratory test curves show them to be from one to two years ahead of the industry. They retain all the fundamentals that have established Hall-Scott engines in the transportation field, but their refinements admit them into an entirely new class.

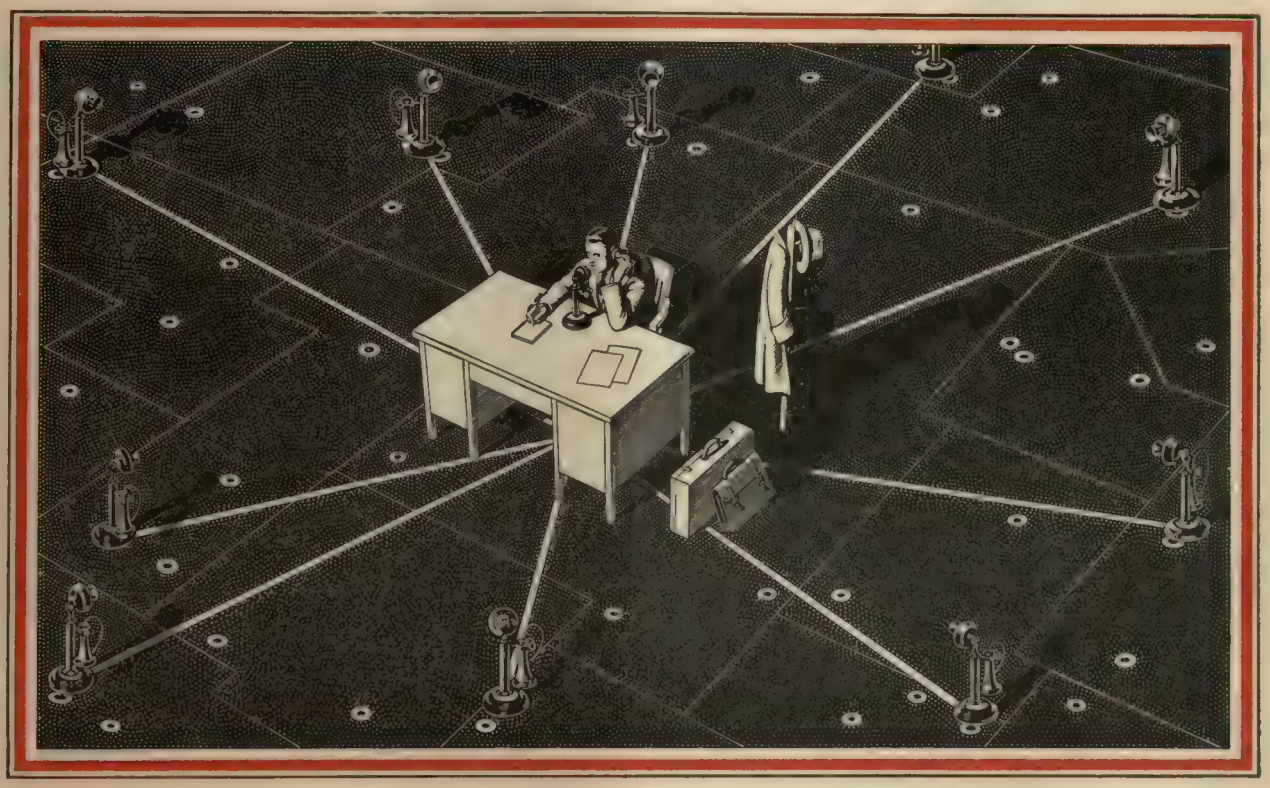
Features such as fully counterbalanced seven bearing crankshafts, with vibration dampener, dual carburetion, dual ignition, entirely new carburetion and manifolding, all contribute to this new superlative performance.

AMERICAN CAR AND FOUNDRY MOTORS COMPANY

30 CHURCH STREET • • NEW YORK CITY



They Cover their Territory twice as often by Telephoning from Key Towns



A MANUFACTURING company, marketing its product nationally, was faced with serious competition. Its salesmen could visit customers only at intervals of several months. They could give little time to developing new prospects. Regional mills and other competitors were making deep inroads into its business.

A Key Town Plan of telephoning was presented to this company and adopted. Its use enables the salesmen to cover their territory at least twice as often, at proportionately lower cost.

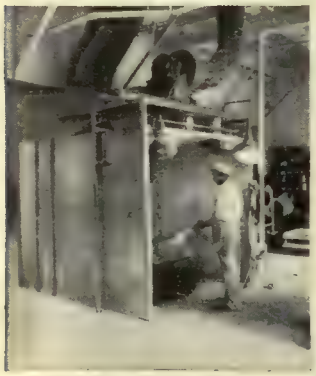
The Key Town Plan is used by many business firms to meet modern conditions. Under this method, the representative goes to the key cities in person. From these he conducts his business in the surrounding area by telephone, buying and selling goods, building good-will, answering questions, adjusting complaints, quoting prices or specifications.

In this way he can cover territory far more quickly. Many business men alternate personal visits with telephone calls, visiting certain cities on one trip and telephoning nearby ones, and reversing the procedure the next.

There is now in effect a further reduction in various long distance rates, saving telephone users of the United States more than $5,000,000 a year. This is the fourth reduction within little more than three years. It is part of the fundamental policy of the Bell System, which is to provide the best possible telephone service at the least cost to the public. Out of town calls are *Quick . . . Easy . . . More economical than ever.*

AMERICAN TELEPHONE & TELEGRAPH CO. AND ASSOCIATED COMPANIES
BELL SYSTEM

Look to DeVilbiss for The Exhausting Equipment Your Particular Operation Demands







COMPLETE SPRAY OUTFITS FOR EVERY PURPOSE.....

Spray guns of various types and sizes.
Pressure feed paint tanks and containers.
Spray booths, exhaust fans, and approved lighting fixtures.
Air compressing equipment.
Air transformers and accessories.
Air and fluid hose and connections.
Complete outfits from the smallest hand-operated units to the largest industrial installations.

HERE is the one place where all the varied industries and operations engaged in spray-painting and spray-finishing find exhausting equipment designed, built, sold and installed with true specialization.

DeVilbiss has provided exhausting equipment for every different spray-painting and spray-finishing task carried on in the world today. DeVilbiss creates exhausting equipment and spray booths for many operations whose needs cannot be adequately served by existing equipment. Whatever may be your need from the finishing of railway cars and buses to the spray-decorating of art objects, DeVilbiss brings a vast experience and a complete understanding to your exhausting problem, and DeVilbiss economically provides exactly suitable exhausting equipment.

It costs you nothing and may save you much to *see us first.*

DeVilbiss Spray-PAINTING FINISHING System

THE DEVILBISS COMPANY , 272 PHILLIPS AVENUE , TOLEDO, OHIO

Sales and Service Branches

NEW YORK PHILADELPHIA CLEVELAND DETROIT INDIANAPOLIS CHICAGO
ST. LOUIS SAN FRANCISCO LOS ANGELES WINDSOR, ONT.

Direct factory representatives in all other territories



A Comfortable, Sanitary and Modern Seat!

HERE is a seat which maintenance engineers will appreciate. Its close-woven cane webbing back and cushion are easy to keep clean. The genuine leather facing on the cushion reinforces the seat at the greatest point of wear. In addition, the individual backs and deep, spring cushions are shaped to allow proper posture and leg freedom. Mechanism rails are set in and the frame of the chair is made of selected Northern hard-grained ash, further strengthened by malleable iron braces. Write to the nearest Heywood-Wakefield sales office for complete details of the 327-M Special and other popular bus and electric railway seats in our line.



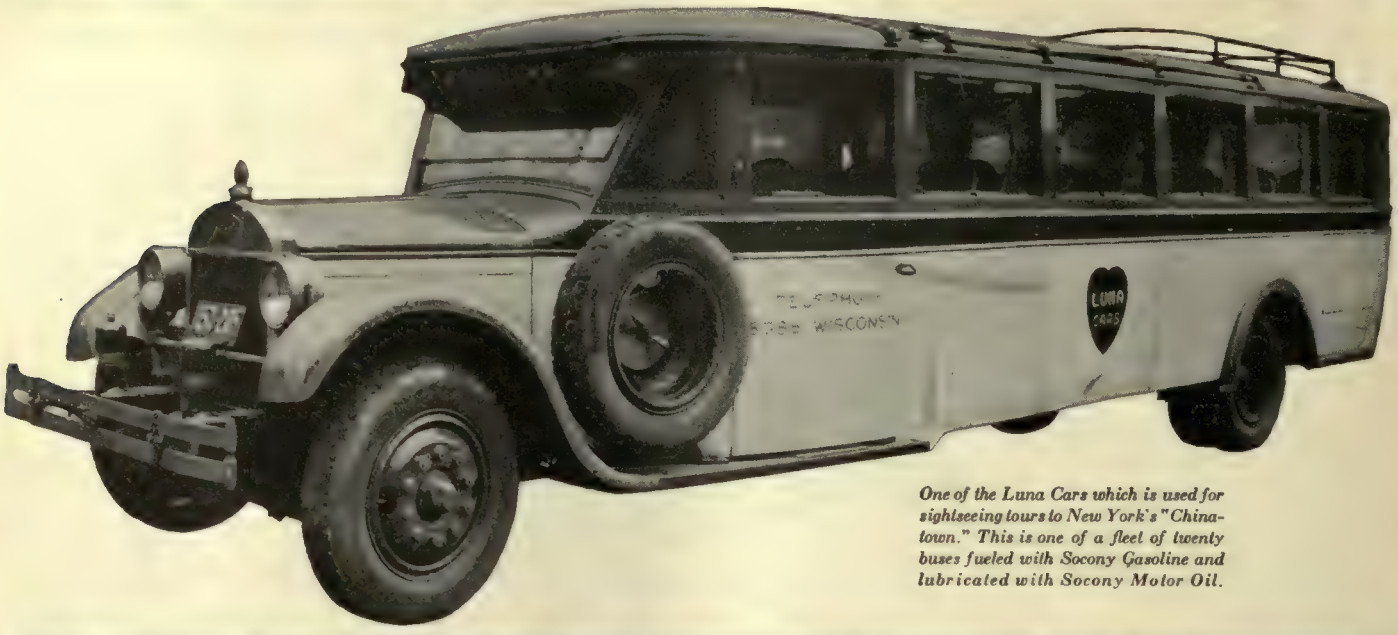
If you have not received a copy of our new Bus Seat Catalogue, write for it.

HEYWOOD - WAKEFIELD COMPANY

BOSTON, MASSACHUSETTS

516 West 34th St., New York City
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
439 Railway Exchange Bldg., Chicago, Ill.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
The G. F. Cotter Supply Co., Houston, Texas

The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada



One of the Luna Cars which is used for sightseeing tours to New York's "Chinatown." This is one of a fleet of twenty buses fueled with Socony Gasoline and lubricated with Socony Motor Oil.

Socony Lubrication
Is Bus Life Insurance

WHEN you buy Socony lubricants, you are buying life insurance for your equipment. By providing correct lubrication, Socony products actually increase the life of the unit parts of your buses and contribute to better operating efficiency. In addition, Socony lubricants make possible longer working periods without lay-ups for repairs.

Socony lubricants have satisfied the exacting requirements of many bus operators in New York and New England—among them the operators of the Luna Cars mentioned above. Let our representative tell you what these oils will do for you.

SOCONY

MOTOR OIL AIRCRAFT OIL
(*Winter Grade*)

GASOLINE · SPECIAL GASOLINE *plus* ETHYL

STANDARD OIL COMPANY OF NEW YORK

Electric Railways to Spend 371 Millions This Year

Based on an Investment of More Than 5 Billions . . . a Gross Revenue of Over a Billion . . . and the Highest Net Income They've Ever Made

THE electric railway companies are budgeted to spend $371,220,000 during 1930 . . . more than a million dollars a day.

For new equipment and maintenance alone, they expect to spend $251,530,000, an increase of more than 15 millions over 1929 . . . more than 25 millions over 1928.

It is significant that not only the totals, but the appropriations for each account are increasing. This can only indicate that *the maintenance standards of the railways are being steadily raised.*

Increasing net profits, expanding bus operations, favorable track readjustments, larger purchases of rolling stock . . . all reflect the great improvement in the financial situation. Nearly 1,500 new cars were purchased, and a larger number of old cars scrapped than ever before, in 1929.

Electric Railway Journal's "Maintenance Contest" will be continued in 1930 for the fourth successive year, in cooperation with the American Electric Railway Engineering Association. These contests have aroused widespread interest in maintenannce practices. Each year has produced an increasingly large number of competitors, nearly 200 having submitted suggestions for improved maintenance in 1929.

THIS YEAR, THEREFORE, the editorial pages, will have special significance . . . the advertising pages extraordinary value . . . in

THE

ANNUAL MAINTENANCE NUMBER

of *Electric Railway Journal*

APRIL ISSUE

Advertising Forms Close March 19.

NEED *a complicated layout?* ..OR *a switch tongue lock-box?*

• • •

WRITE TO



LORAIN

Lorain

GIRDER RAILS
GIRDER GUARD RAILS
PLAIN GIRDER RAILS
RAIL JOINTS AND TRACK ACCESSORIES
EXPANSION JOINTS FOR ELECTRICALLY WELDED TRACK
SPECIAL TRACKWORK
SWITCHES, FROGS AND CROSSINGS

in

Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail.

It should be particularly gratifying to know that, from the most minor piece of track equipment to the most complicated type of construction, you can look to one manufacturer for prompt, efficient, satisfactory service.

LORAIN'S experience and leadership in trackwork development date all the way from horse-car days to its present modern, complete line of standard and special equipment. The service you can expect from LORAIN is more than the mere supplying of materials; it includes an appreciation of, and a helpful solution to, your every trackwork problem.

THE LORAIN STEEL COMPANY
JOHNSTOWN, PA.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL PORTLAND CEMENT COMPANY

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

Lorain Sales Offices—ATLANTA CHICAGO CLEVELAND DALLAS NEW YORK PHILADELPHIA PITTSBURGH



Bond Performance

One of the advantages of buying American Steel and Wire Company Rail Bonds is the assurance you will have of dependable performance. The reason is materials, design, and construction. Our experience has been of the kind that is worth money to you in Bond performance.

The AB-2 Bond is easily and quickly applied with a steel electrode. The open shape of this Bond terminal is especially desirable since the arc can be directed freely at the junction of the terminal and the rail.

Would you be interested in inspecting a sample?

AMERICAN STEEL & WIRE COMPANY

208 S. La Salle Street, Chicago 30 Church Street, New York
And All Principal Cities

SUBSIDIARY OF

UNITED STATES STEEL CORPORATION

Quality Products *Dependable Service*

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

American Bridge Company
American Sheet and Tin Plate Company
American Steel and Wire Company
Carnegie Steel Company
Cyclone Fence Company
Federal Shipbuilding and Dry Dock Company
Illinois Steel Company
Minnesota Steel Company
National Tube Company
The Lorain Steel Company
Tennessee Coal, Iron & R. R. Company
Universal Portland Cement Company

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

Remodeling a CITY'S STREETS *with* UNION METAL POLES



A typical "street of the past". Note the obsolete cluster-type lighting standards and the trolley poles extending down the center of the street.



The same street resurfaced and modernized with an installation of Union Metal all-purpose poles.

NARROW thoroughfares, cluttered with a variety of posts and poles, fail to measure up to the standards of the modern City Beautiful.

When Union Metal Fluted Steel Poles are installed, streets take on a new, fresh, neat appearance. Unlike ordinary poles, they add to, rather than detract from the beauty of the street. They are, in themselves, pleasing to the eye.

These poles are strong enough to carry ALL necessary electrical equipment . . . trolley span wires, feeder lines, lighting units, distribution lines, traffic signals and street signs. Consequently the number of poles along the street may be reduced as much as 75%. The curb-line forest vanishes.

Embodied in Union Metal Poles are construction principles which make them strong, light and long lived. They can be installed at a low cost. Upkeep expense is nominal. And during the many, many years they are in service, Union Metal Poles are consistent builders of good will for their owners.

THE UNION METAL MANUFACTURING CO.
GENERAL OFFICES AND FACTORY: CANTON, OHIO
SALES OFFICES: New York, Chicago, Philadelphia, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

DISTRIBUTORS
General Electric Supply Corp. Graybar Electric Company, Inc.
Offices in all principal cities

Distributed by GraybaR

UNION METAL

MERCHANDISE DISTRIBUTOR

DISTRIBUTION AND TRANSMISSION POLES

THE NEW Mack

6-CYLINDER BUS MODEL B C

AT LAST . . . AN "INTERMEDIATE SIX" —ON ROUTES WHERE FOUR AND LIGHT-SIX CYLINDER BUSES ARE OVERWORKED AND BIG SIXES UNDER-WORKED AT HIGH OPERATING COSTS . . . THIS BUS CREATES PROFITS.

This latest addition to the line of Mack Buses is the much needed "intermediate six" for city or interstate service.

It will handle profitably and comfortably up to 33 seated passengers (and an equal number of standees) without overtaxing its power.

Its outside and inside appearance and finish, with all steel base, wide service doors, roomy aisles and luxurious seats, need no selling to men who know Mack standards.



THE NEW *Mack* 6-CYL

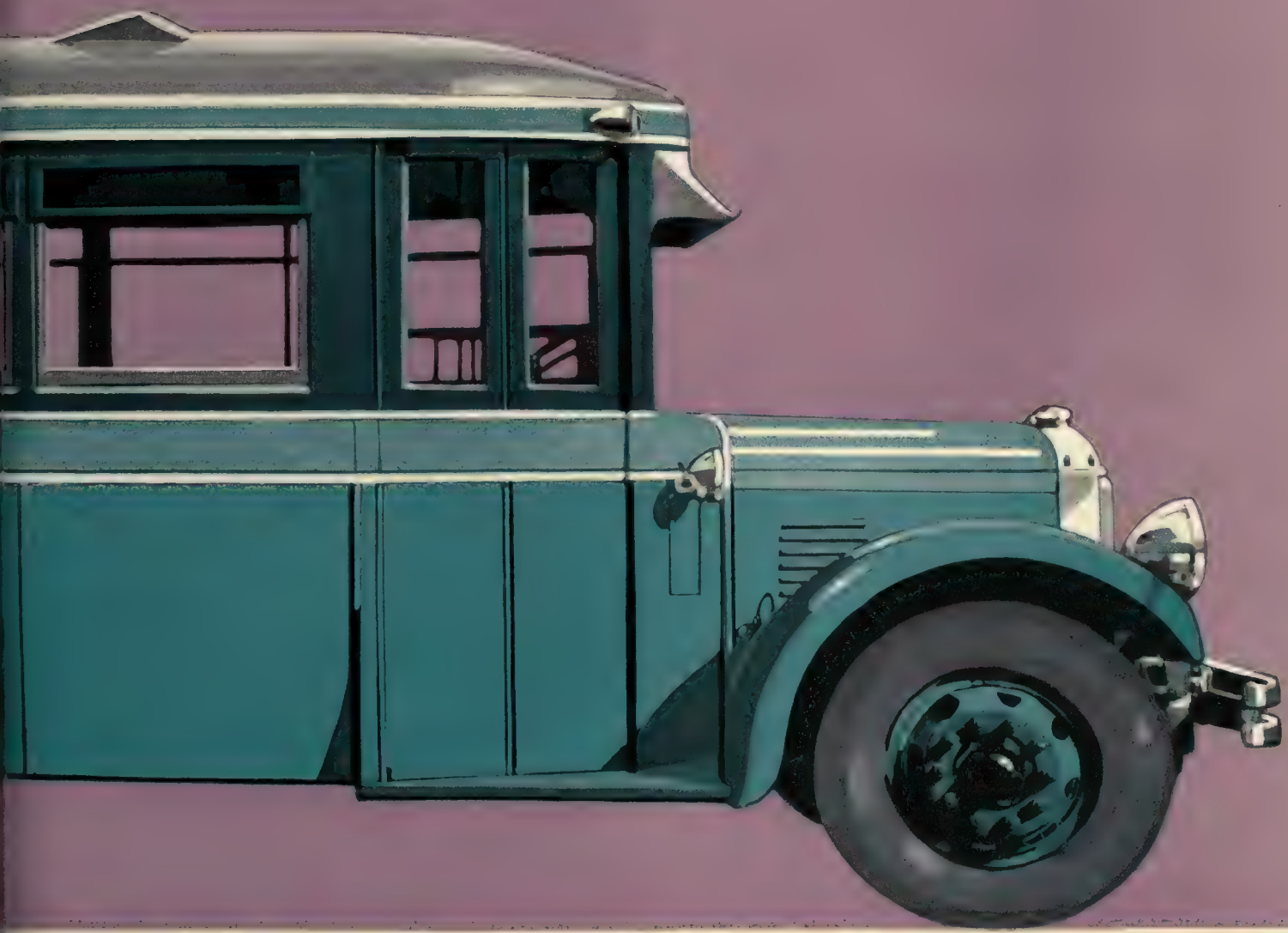
The outstanding features of this Mack BC Bus are the power and flexibility of the exceedingly compact 100 h.p. six-cylinder engine:

—the large drop-forged, case-hardened crankshaft with 7 main bearings 3″ in diameter

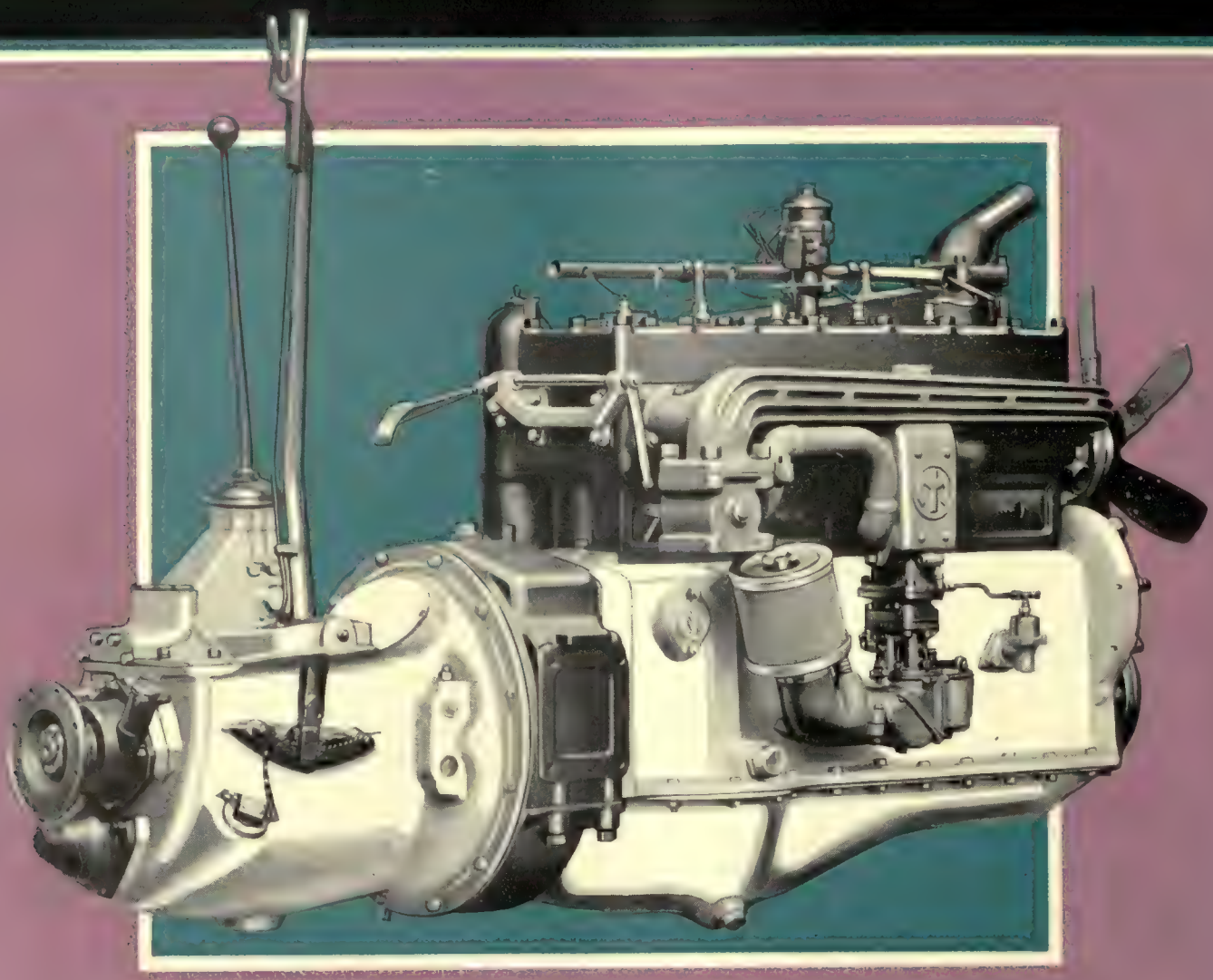
—the silent, super-strong Mack Hypoid Bevel Gear final drive for high-speed service

—with full floating shafts in a one piece, drop forged chrome nickel steel banjo type axle.

In short, in *capacity*, in *power*, in *speed* and in construction to "stand the gaff," Mack Model BC is exactly the bus long desired to fill a definite need in the field today.



NDER BUS MODEL BC 33 SEATED PASSENGERS



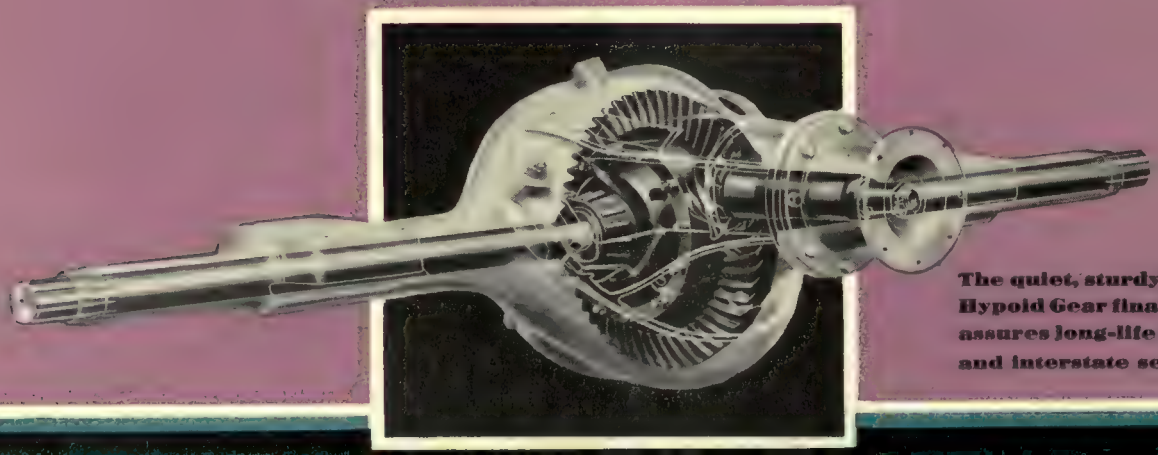
Model BC 100 h. p. six-cylinder Engine. Exclusive cold circulation type thermostatic cooling system which prevents overheating and overcooling.

A few of the Mack BC Bus users:

Albany Transit Co. . .	Albany, N. Y.	Hamburg Railway Co.	Buffalo, N. Y.
Allentown & Reading Transit Co.	Reading, Pa.	Howard Bus Line, Inc.	Columbus, Ga.
Atlantic Stages, Inc. .	Philadelphia, Pa.	Montreal Tramways .	Montreal, Canada
Cincinnati Street Railway Co.	Cincinnati, Ohio	Queen City Coach Co.	Charlotte, N. C.
C. J. Drimal	Baltimore, Md.	St. Joseph Railway, Light, Heat & Power Company	St. Joseph, Mo.
Durham Public Service Co.	Durham, N. C.	Tri-City Railway Co. .	Davenport, Iowa
Georgia-Florida Motor Lines	Atlanta, Ga.	Charles Vollmer	Amsterdam, N. Y.
		Nathan Zeskind	Baltimore, Md.

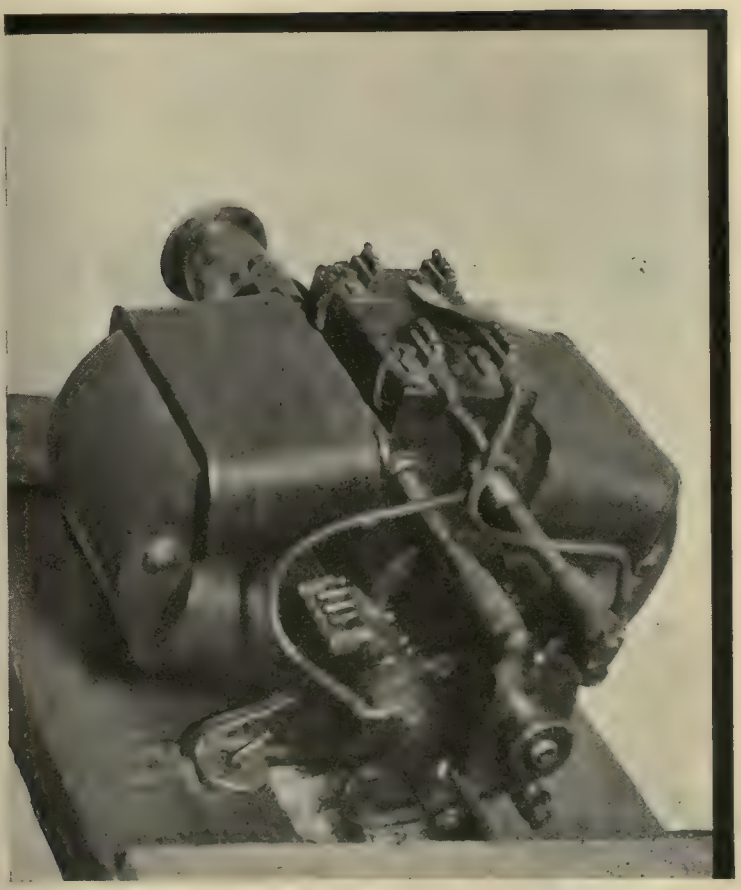
MACK TRUCKS, INC.

25 Broadway, New York, N.Y.



The quiet, sturdy Mack Hypoid Gear final drive assures long-life in city and interstate service.

you wouldn't know the old boy now!



Above: PERRETT, *½-horse-power, 110-volt D.C. motor*



At left: MODERN, *½-horse-power, 110-volt, commutating type A.C. motor*

WHEN electricity was young, the ½-horse-power Perrett motor pictured above was considered the latest in small motor design. It was one of the first ones built with a laminated field core. It was equipped with a row of pencil carbon brushes. Today this same motor has become obsolete. In its place we have the commutating type A.C. motor which bears but slight resemblance to its forebear. As brush manufacturers, National Carbon Company, Inc., has kept pace with this progress made by modern engineering.

The fractional horse-power motor of today, which plays such an important part, both in industry and in the home, would not have been possible without the laminated field which was a feature of the early Perrett motor. Of equal importance in this development has been the advance in brush manufacture. The exacting demands placed upon these little motors require a brush of superior commutating characteristics and long life, free from abrasive action and quiet in operation. These needs have been met by our engineers in the Research Laboratories of National Carbon Company, Inc.

National Pyramid Brushes are manufactured under careful supervision and scientific control. They are maintaining the reputation for satisfactory performance established and held through the years of rapid development in the electrical industry.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

Carbon Sales Division — SILVER STRAND CABLE TRADE MARK REGISTERED — Cleveland, Ohio

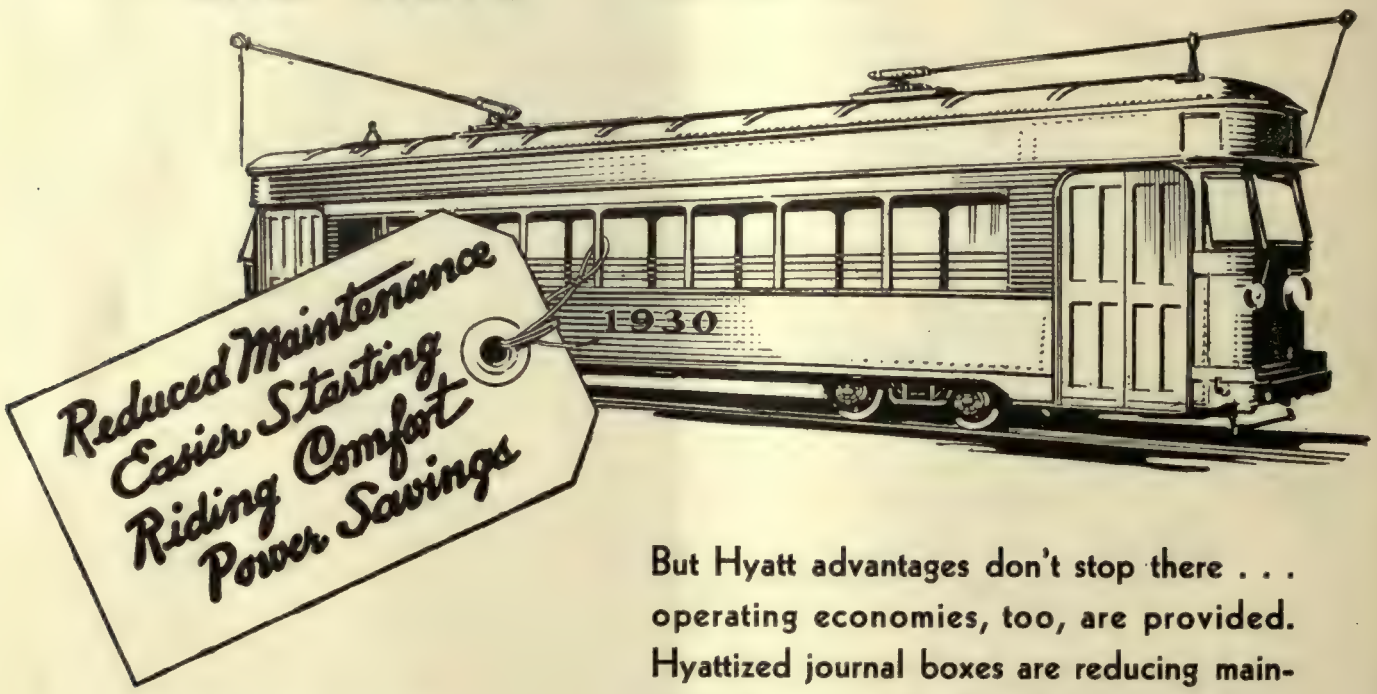
Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco

Here's What You Get —and more

Hundreds of Hyattized cars in operation on street railways and interurban lines throughout the country are proving the practicability of Hyatt Roller Bearings for journal box service.

With friction free Hyatts replacing plain brass journals, jerky starting and stopping is eliminated and substituted with smooth, quiet, joltless riding . . . the kind of riding comfort passengers enjoy.



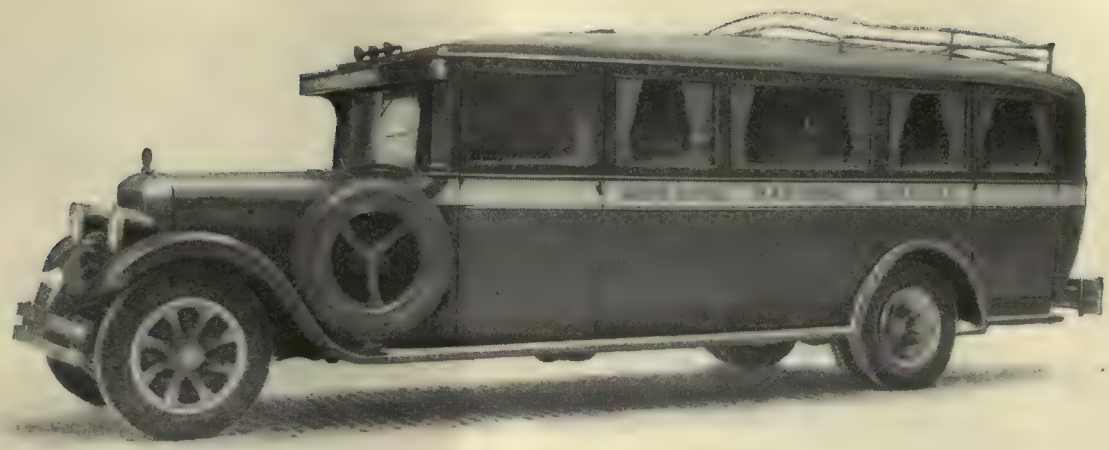
From the standpoint of application, operation, dependability and greater riding comfort, Hyattized journal boxes have so many advantages in their favor that they are fast becoming the standard railway anti-friction bearing.

But Hyatt advantages don't stop there . . . operating economies, too, are provided. Hyattized journal boxes are reducing maintenance, saving power, and helping to keep the cars out of the repair shops.

Repeat orders from property after property is the best indication that Hyatts are making good. That Hyatt journal boxes conform to A. E. R. A. standards is another point in favor of their wide-spread use.

HYATT ROLLER BEARING COMPANY
NEWARK DETROIT CHICAGO PITTSBURGH OAKLAND

HYATT
ROLLER BEARINGS
PRODUCT OF GENERAL MOTORS



One of the Buses of the Higgins Transit Co. which operates between Grand Rapids, Hastings, Kalamazoo, and Battle Creek, Michigan.

"We are about to enter our 5th Year on Goodrich 100%,"



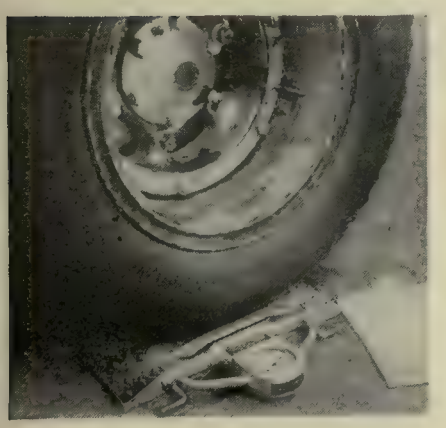
SAYS E. C. HIGGINS, *President*, HIGGINS TRANSIT COMPANY

MR. E. C. HIGGINS, President of the Higgins Transit Co., Hastings, Michigan, expresses a typical attitude toward Goodrich.

"Our entire fleet is equipped with Goodrich Tires.

"We are about to enter our fifth year on Goodrich; our fifth year, by the way, of very complete satisfaction, both in our dealings with Goodrich and in the consistent mileage which we have received from our tires.

"We believe you will be happy to know our true feelings. We are certainly strong for Goodrich Bus Tires, and you may rest assured that as we add to our fleet, Goodrich will be the tire equipment."



Goodrich Distributors enable you to keep a check on "pay loads" and overloads by means of the Loadometer which indicates the weight on each wheel.

Seven Superior Specifications
Built Into Every Heavy Duty Silvertown

1. Heavily insulated stretch-matched cords.
2. Additional adhesion—from greater insulation between outside plies.
3. Heavy twin beads for better rim seating.
4. Extra gum fillers between plies for longer tire life.
5. Heat-resisting, interlocking cord breakers.
6. Tread designed correctly for heavy duty service.
7. The whole tire toughened by the famous Goodrich "water cure."

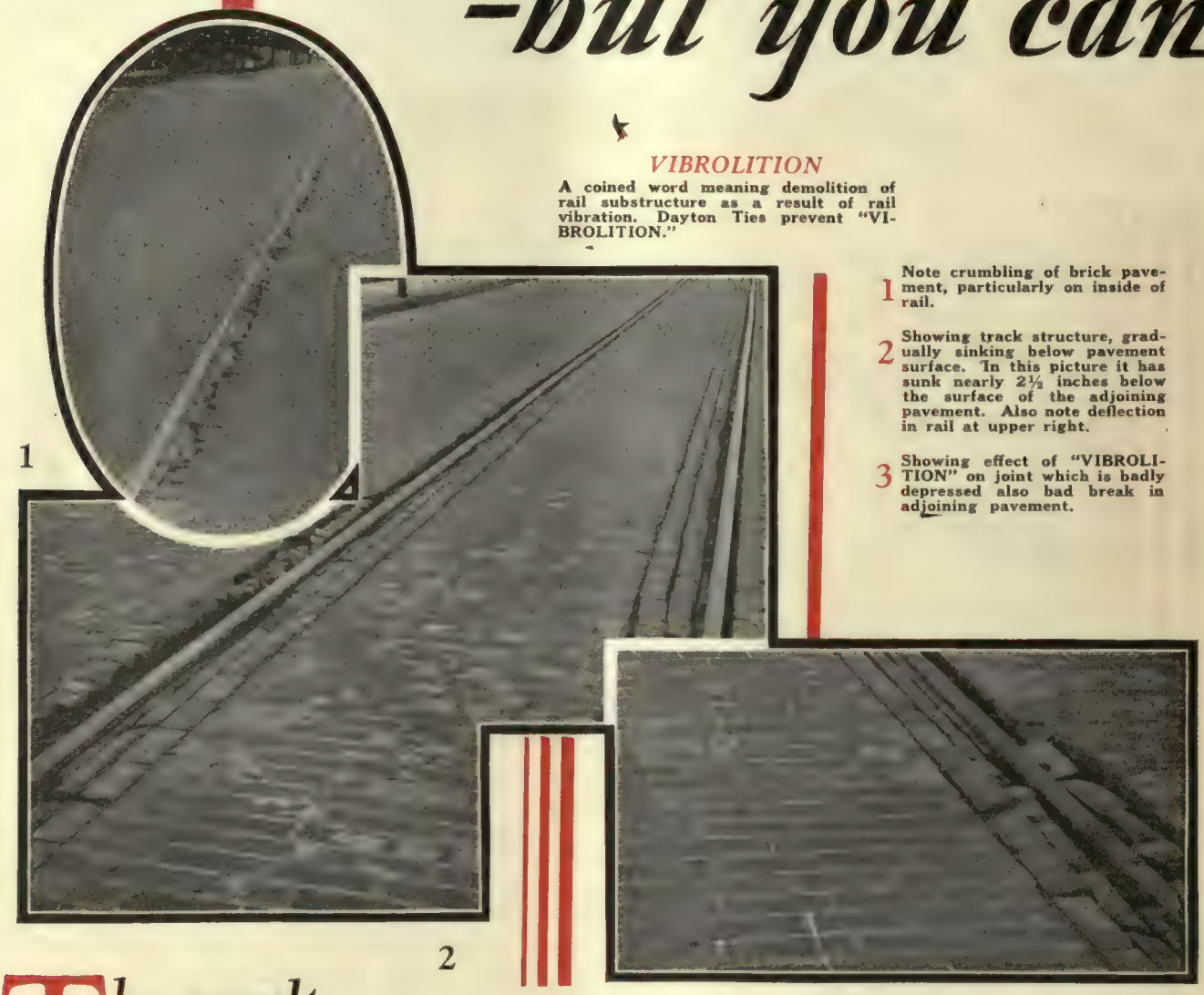
The B. F. Goodrich Rubber Co., Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ontario.

Goodrich HEAVY DUTY Silvertowns

SPECIFY GOODRICH ON YOUR NEW BUSES

You *can't* bury *-but you can*

VIBROLITION
A coined word meaning demolition of rail substructure as a result of rail vibration. Dayton Ties prevent "VIBROLITION."



1 **Note crumbling of brick pavement, particularly on inside of rail.**

2 **Showing track structure, gradually sinking below pavement surface. In this picture it has sunk nearly 2½ inches below the surface of the adjoining pavement. Also note deflection in rail at upper right.**

3 **Showing effect of "VIBROLITION" on joint which is badly depressed also bad break in adjoining pavement.**

The result of trying to bury VIBROLITION!

DO YOUR STREETS SHOW IT?

Concrete correctly used—is the ideal foundation for track and paving substructure. But it must be protected from "VIBROLITION."

As long as the marks of "VIBROLITION" remain submerged, they will be ignored, but once they break through to the surface—as they will do—*it's everybody's business.* These surface signs are only a small indication of the greater physical disorder . . . underneath.

Despite the untold damage done by this scourge of so called permanent structure, however, "VIBROLITION" has accomplished two great things for the electric railway industry. First it has exploded the fallacy that a vibrating steel rail can be permanently installed and secured in concrete without a means of protecting that concrete . . . and secondly, it has brought to the forefront the only tie, substitute or otherwise, that positively and permanently prevents it.

"The Better Tie

THE DAYTON INTEGRAL SYSTEM OF

THE DAYTON MECHANICAL

VIBROLITION

prevent it with DAYTON TIES



The track shown above is a continuation of the track shown in picture No. 1, opposite page. But in this section Dayton Ties were used. Note the unbroken pavement and absence of any sign of "VIBROLITION."

THERE is no cure for "VIBROLITION" once this trouble makes known its presence, without complete rehabilitation of the track structure. But fortunately it can be prevented by installing *in the first place* the only tie that will permanently prevent it. And this prevention of "VIBROLITION" is but one of many advantages which Dayton Ties provide . . . smoother trackage . . . noise elimination . . . increased comfort for passengers . . . decreased wear on rolling stock and most of all, a positive reduction of maintenance costs. No other tie, substitute or otherwise, can do this for you. And yet, Dayton Ties can be installed at lower costs than the cheapest track you ever built.

Can you afford to ignore such facts without first getting a quotation for your 1930 work? Write today.

Send for your copy of this book!

Every maintenance engineer interested in lower maintenance costs will want a copy. Write today for yours.



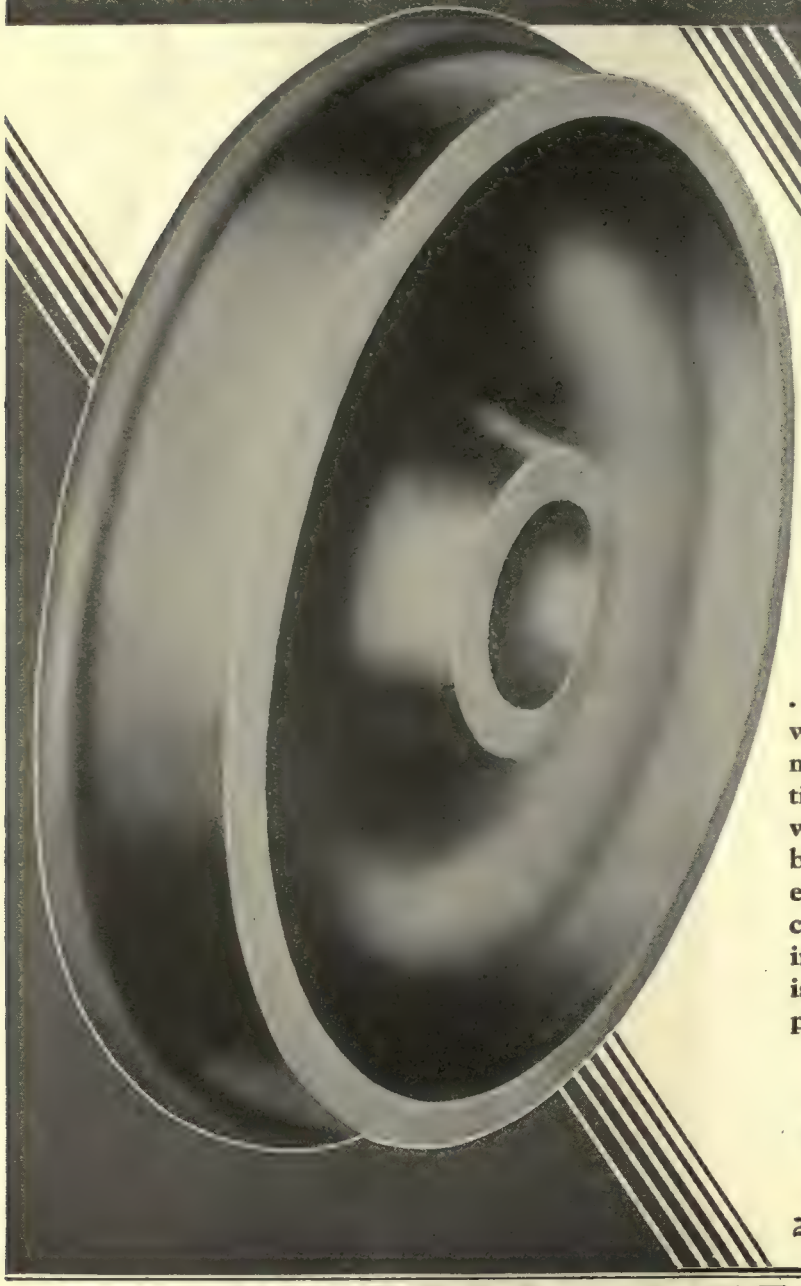
Without an Alibi"

TRACK AND PAVING STRUCTURE

TIE CO.,-DAYTON, OHIO

GARY

WROUGHT STEEL WHEELS





. . . . "ILLINOIS" on a wrought steel wheel is more than a mark of identification. It means a wrought steel wheel produced by the best and most modern equipment. . . . Expert supervision, careful workmanship and frequent inspection from wheel block to finished wheel all tend to produce multiplied mileage at low cost.

Our Wheel Engineers are at your service.

Illinois Steel Company

Subsidiary of United States Steel Corporation

General Offices:

208 South La Salle Street .. Chicago

ALL THAT GOOD WHEELS SHOULD BE

What is TULC?



The answer is—
Unusual results and
Less maintenance
Costs.

In the operation of
Street Railway

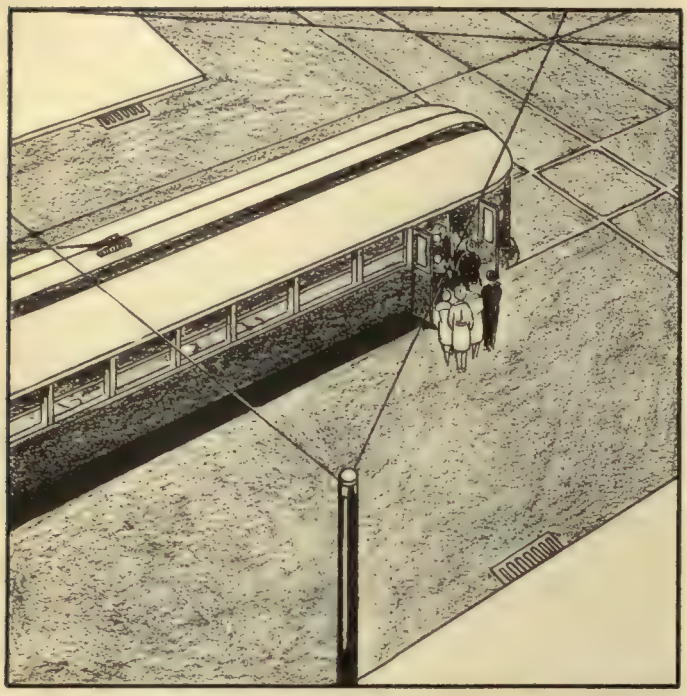
Appliances.

Lubricant which produces
Unexcelled results.
Bearing life increased—
Replacement costs lessened.
It reduces hot boxes, etc.
Cuts lubricating troubles—
Always uniform—
No acid—no filler—no dripping
Test it—see for yourself.

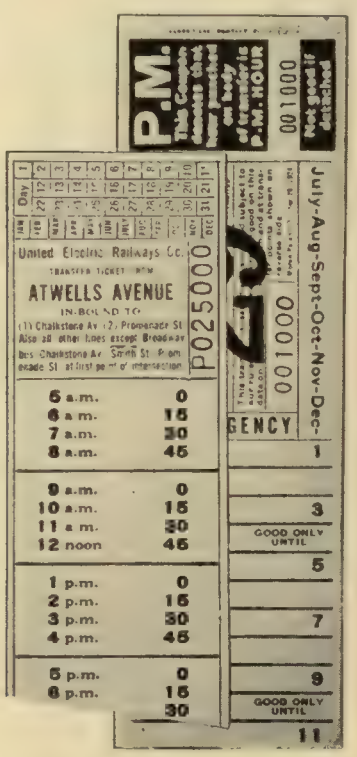
The UNIVERSAL LUBRICATING CO.

CLEVELAND - - - - OHIO

DAM UP THE LEAKS AT TRANSFER POINTS WITH A GLOBE-DESIGNED TRANSFER SYSTEM







Many well-known street-railway companies are cashing in on a new transfer system, designed by Globe to meet modern traffic demands. No two will operate exactly alike, and right here is one reason why Globe's half-century of experience is of value. Having on file many problems similar to the one in question (yours, let's say), we can help you initiate a series of transfers to eliminate a majority of the revenue leaks now suffered by the present system.

Are we sincere? Investigate, Buffalo, Toledo, Akron, Baltimore, and the rest. Then let us help you.

Globe
TICKET COMPANY
PHILADELPHIA

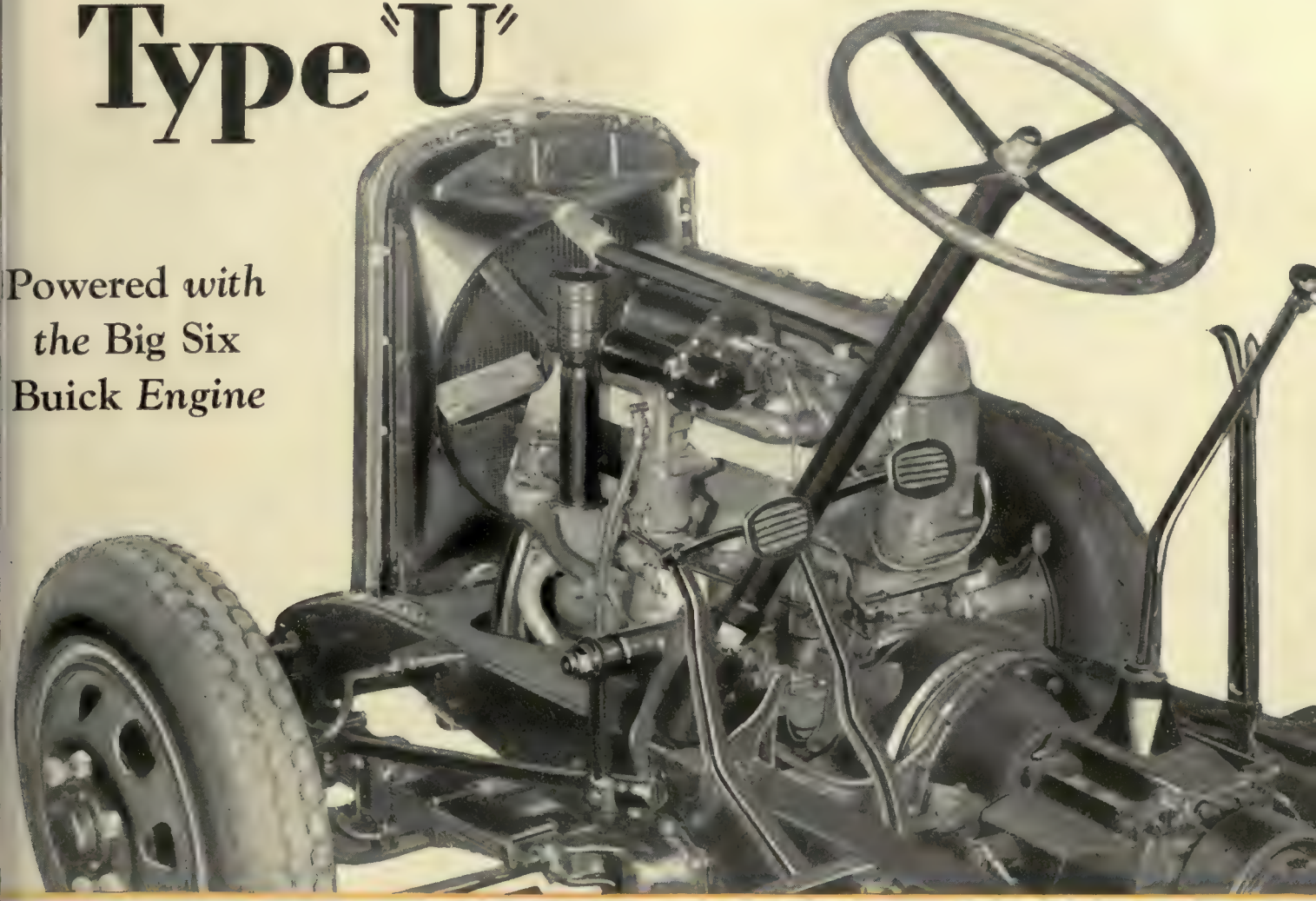
Factories:
Philadelphia Los Angeles Boston New York
Jacksonville

Sales Offices:
Syracuse Cincinnati Pittsburgh
Baltimore Cleveland Springfield, Mass.

Announcing a *New* Yellow Coach

Type "U"

Powered *with the* Big Six Buick *Engine*



Buick Power Plant Assembly in the Type "U" Chassis

THE persistent demand for a coach that would be *the same as the Yellow Type "W" but powered with a six-cylinder engine* is now met in this new Type "U" Yellow Coach—the latest addition to the Yellow line.

Type "W" introduced wholly new standards in small capacity coach construction. In the new Type "U" these standards are duplicated and maintained. Only in the most costly large capacity coaches will the same features be usually found. The Type "W" made them available at a new level of economy.

Now they are found in this latest addition to the Yellow family—at a price that represents still a greater saving in initial cost.

In Type "U" is found the same powerful, smooth four-wheel service brakes with their perfect automatic equalization of brake pressure on all four wheels . . . the same exceptionally strong and rigid frame with its seven sturdy cross members; three of them tubular . . . the same outboard

The 21 Passenger City Service





The 16 Passenger Parlor Coach

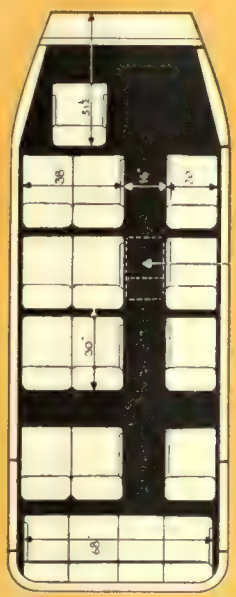
mounting of the front springs; secret of the exceptional riding qualities, roadability and easy steering of the Type "W" . . . the same oversize, underslung worm drive rear axle . . . the same accessibility and betterments that simplified maintenance and reduced operating costs in the Type "W" . . . all are here.

In addition to the Type "W" with its 8-cylinder engine, the Type "U" now makes available a six—the big new Six developed by Buick . . . famous for its power, low maintenance cost and fuel economy. Its exceptional stamina and dependability have been demonstrated in many millions of miles of actual service.

To balance with this power plant a different clutch, transmission and transmission brake has been developed, thoroughly tested and adopted.

With these exceptions, virtually the same chassis specifications that apply to the Type "W" fit the Type "U". Many of the chassis parts are interchangeable. And in appearance, dimensions, workmanship and appointments the bodies are identical.

Parlor Coach Seating Plan



GENERAL MOTORS TRUCK COMPANY

Pontiac, Michigan

Subsidiary of Yellow Truck & Coach Mfg. Co.

Type "U"

MODELS AVAILABLE

21 passenger city service

16 passenger parlor coach

Yellow Coach

Powered with The Big Six Buick Engine

Announcing A new Series

Type "W"

with the new and more powerful 8 cylinder Cadillac Engine



21 Passenger Observation

IN THE entire history of bus operation in America no model of coach has ever enjoyed the popularity of the Type "W." More Type "W"s were purchased last year than any other type or model of motor coach produced in America.

Everywhere, Type "W" has been extraordinarily satisfactory to the hundreds of different companies who have put this model in operation. It has successfully demonstrated its capacity in every class of service . . . built revenue and cut operating costs for many companies in both city and intercity service . . . been adopted with unusual success for developing new routes, for rendering de luxe service at a high rate of fare, for special charter service. It is recognized everywhere as a thoroughly tried and seasoned transportation vehicle.

Now comes the new series Type "W," retaining all of the proven features of design that have been so enthusiastically endorsed by operators plus new betterments and refinements that definitely add to performance, to ease of maintenance and to still lower operating costs.

Equipped with the new and more powerful 8 cylinder, V-Type Cadillac Engine



Chassis improvements include the new and more powerful eight-cylinder V-type Cadillac engine,



The 21 Passenger City Service

modified to meet the requirements of motor coach operation . . . increased displacement . . . increased bore . . . smoother operation. A bigger generator . . . 600 watt capacity. Better carburetion . . . automatic heat control . . . air cleaner. Improved ignition distributor . . . with heavier condensers and provision for lubricating bearings. Dual ignition coils . . . provision against road failure . . . with a ten second change-over switch. An improved starting motor . . . with Bendix drive. An improved clutch of the twin disc dry plate type . . . smooth . . . long lived. On the highway or in city service the performance of the new Type "W" is smooth, quiet, and powerful beyond any comparison in the small coach field. Its flexibility and rapid acceleration are truly remarkable — truly comparable to passenger car performance. And it has the fastest, smoothest trouble-free brakes ever designed for coach use.



GENERAL MOTORS
TRUCK COMPANY
Pontiac, Michigan

Subsidiary of
Yellow Truck & Coach Mfg. Co.

Type "W"

MODELS

21 passenger parlor observation
21 passenger city service
21 passenger de luxe city service
17 passenger parlor coach

Yellow Coach

with the new and more powerful Cadillac Engine

3 types of Johns-Manville FLOORING to meet every need of the modern Bus and Railway Car

CONSIDER the flooring of your buses and cars. Why not specify it as you do other equipment? Flooring not only affects the cost of the bus or car, but what is equally important—the cost of maintenance and the appearance. Johns-Manville offers a choice of flooring from the lowest-cost, lifetime floor to the most De Luxe flooring obtainable. For every type of bus or railway car there is a J-M Flooring that will meet every requirement and insure lasting service.

J-M Masticoke
Low Cost — Long Life

J-M Masticoke provides a floor that is pleasing in appearance, is long-lasting and *low in cost*. This modern flooring will meet the severest service requirements. It will last the life of the bus or car without maintenance. Its surface is slip-safe. It will not retain dust, dirt or germs. It is easily cleaned by flushing with water. Its color is a pleasing dark gray. When you want a *low-cost* floor that will give trouble-free service, specify J-M Masticoke Flooring.

J-M Magnesite
For Decorative Effects

Where, in addition to durability and free maintenance, you want an attractive flooring which can be secured in flat colors to harmonize with the bus or car interior, specify J-M Magnesite. In attractiveness and durability, this floor will give the best-dollar for dollar-flooring value in a colored floor that can be bought for your buses.



J-M MASTICOKE



J-M MAGNESITE



J-M TILE FLOORING

J-M Tile Flooring
The De Luxe Flooring

For the highest type of equipment, here is a flooring that provides the utmost in appearance without sacrifice of durability. Light in weight, this flooring allows color combinations and assorted designs which will greatly enhance the decorative effect of the most luxurious coach or interurban car. J-M Tile Flooring is resilient—quiet and comfortable to walk on. It provides the superlative in flooring. Its cost is not high.

. . .

The long life and satisfactory service of J-M Masticoke Flooring has been well demonstrated by its extensive use on railroad coaches and Pullman Cars. Where color is necessary, J-M Magnesite and J-M Tile Flooring answer every requirement of railway car and bus service and maintenance at a comparatively low cost. Mail the coupon for information on these J-M Floorings.

Bus & Car Insulation · Refractory & Insulating Cements · Fibre Conduit · Asbestos Exhaust Pipe Covering · Asbestos Shingles · Packings · Brake Blocks & Linings · Transite Built-up & Ready-to-lay Roofing · Asphalt Plank · Tile Flooring · Power Plant Insulations · Masticoke & Truss Plate Flooring · Electrical Insulating Materials · Friction Tape

JM PRODUCTS **Johns-Manville**

SERVICE TO TRANSPORTATION

Address JOHNS-MANVILLE
At nearest office listed below
New York Chicago Cleveland San Francisco Montreal
(*Offices in all large cities*)

Please send me complete information on J-M Bus and Railway Car Floorings.

Name.....

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How Much Should a Wheel Weigh ?



ENOUGH metal must be put in a car wheel to give adequate strength and wear resistance. How much of it is necessary to fulfill these conditions depends upon the kind of metal used. By reason of its special heat-treated composition the Davis "One-Wear" Steel Wheel can secure a given result with a minimum weight. It's the special metal that makes the difference.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS



Bethlehem Silico-Manganese Weldable Crossing and turnout at 10th and Arch Sts., Philadelphia, Pa.

For heavy-traffic locations use *silico-manganese* trackwork

THE new Bethlehem Silico-Manganese Weldable Trackwork has high resistance to impact and abrasive wear. The extremely fine-grain and dense structure of silico-manganese steel becomes more firmly set under constant impact. These qualities combined with weldability make Bethlehem Silico-Manganese the logical trackwork to install at all heavy-traffic locations.

Bethlehem Silico-Manganese Trackwork is readily weldable by any of the standard methods, such as electric-arc, oxy-actylene or Thermit welding.

The wear-resisting properties of Silico-Manganese steel are well established. For years it has been the standard for high-grade tools such as punches, chisels, shear blades, etc., as well as for finest quality automobile springs, and for parts subject to shock and extremely hard grinding wear with little or no lubrication.

Bethlehem Silico-Manganese Weldable Trackwork can be installed at all heavy-duty locations with confidence that it will stand up under the most severe conditions of service.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

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BETHLEHEM
Silico-Manganese Trackwork—Design 999

The inevitable by-product

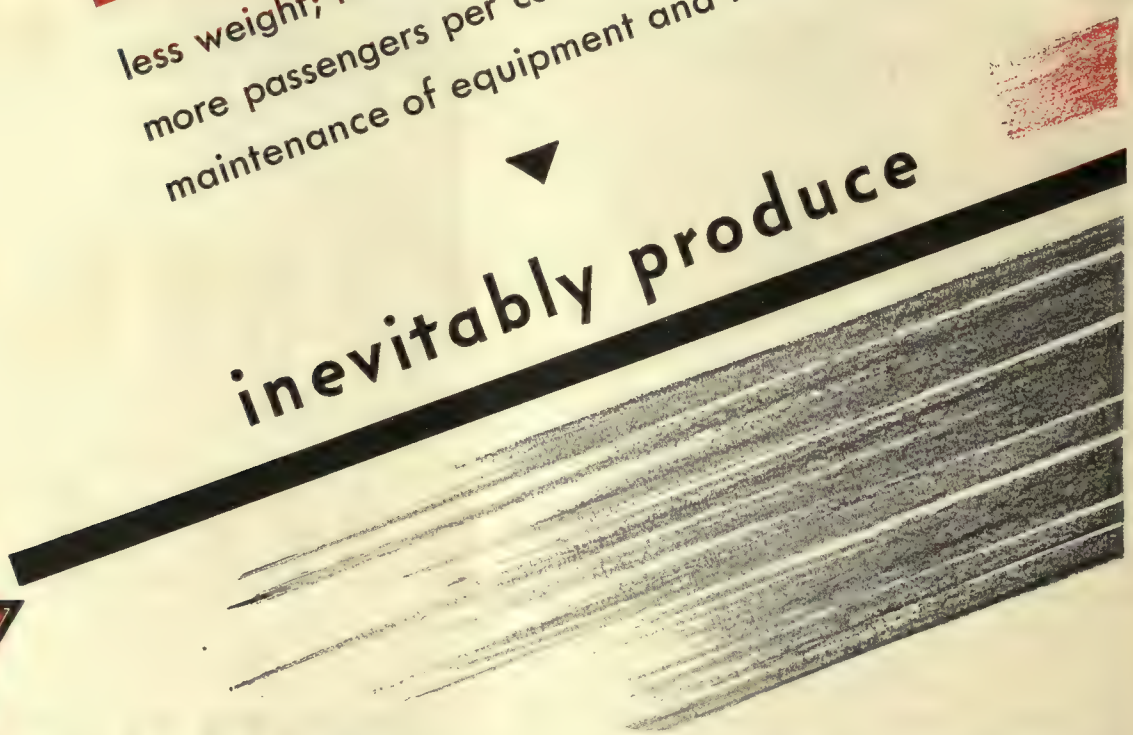
More fares
induced by quieter, smoother, faster, more comfortable transportation

▼

Lower costs
less weight; faster schedules that mean more passengers per car-hour; lowered maintenance of equipment and tracks

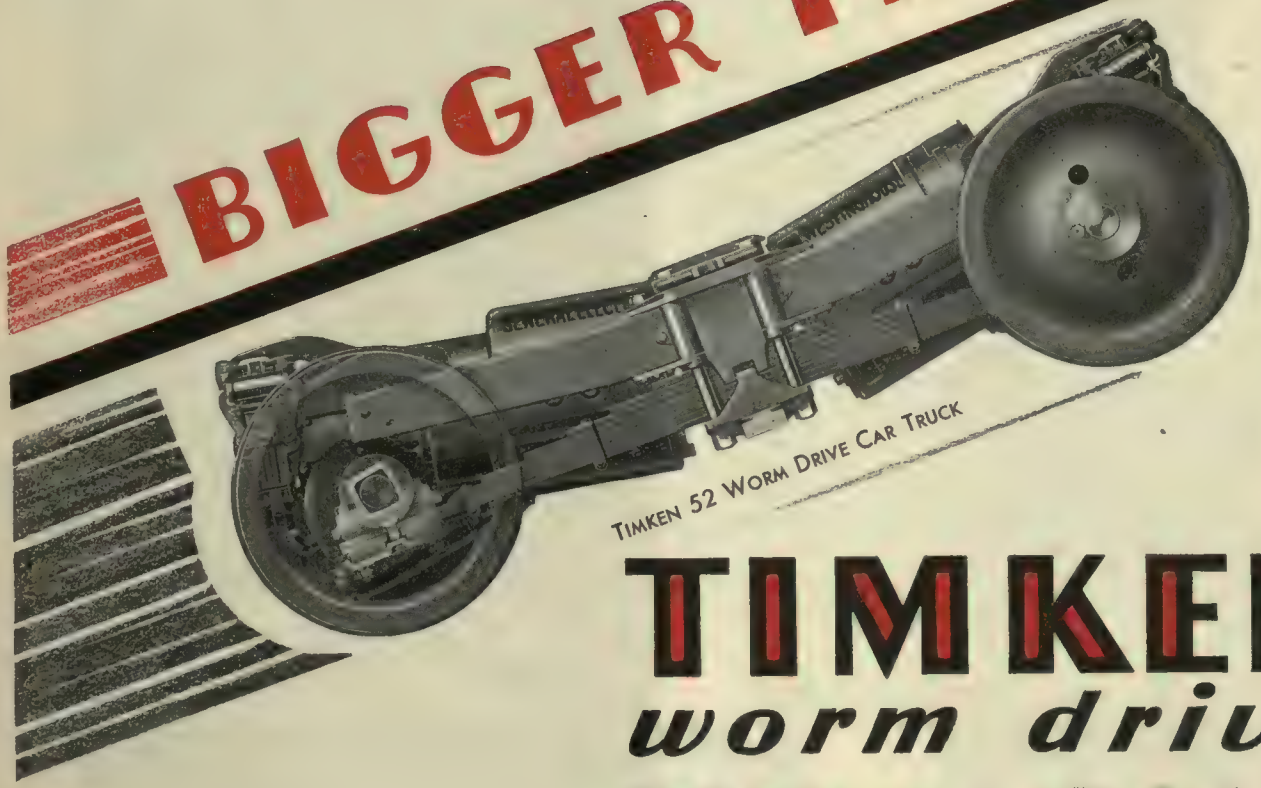
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inevitably produce



THE TIMKEN-DETROIT

BIGGER PROFITS



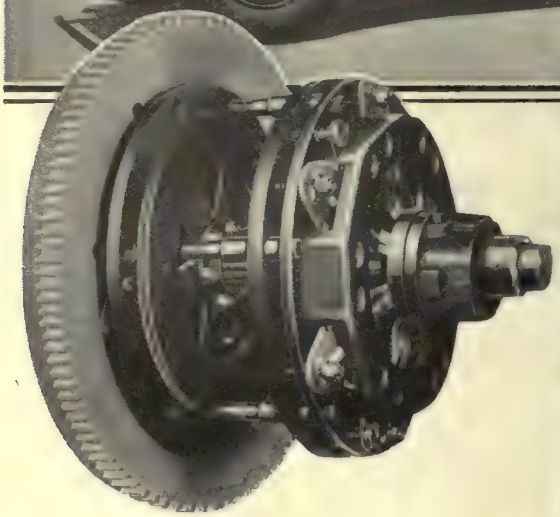
TIMKEN 52 WORM DRIVE CAR TRUCK

TIMKEN
worm drive
TRUCKS
for electric railway cars

AXLE CO., DETROIT, MICH.

LONG CLUTCHES ARE USED ON THE COMPLETE LINE OF AUTOCAR TRUCKS



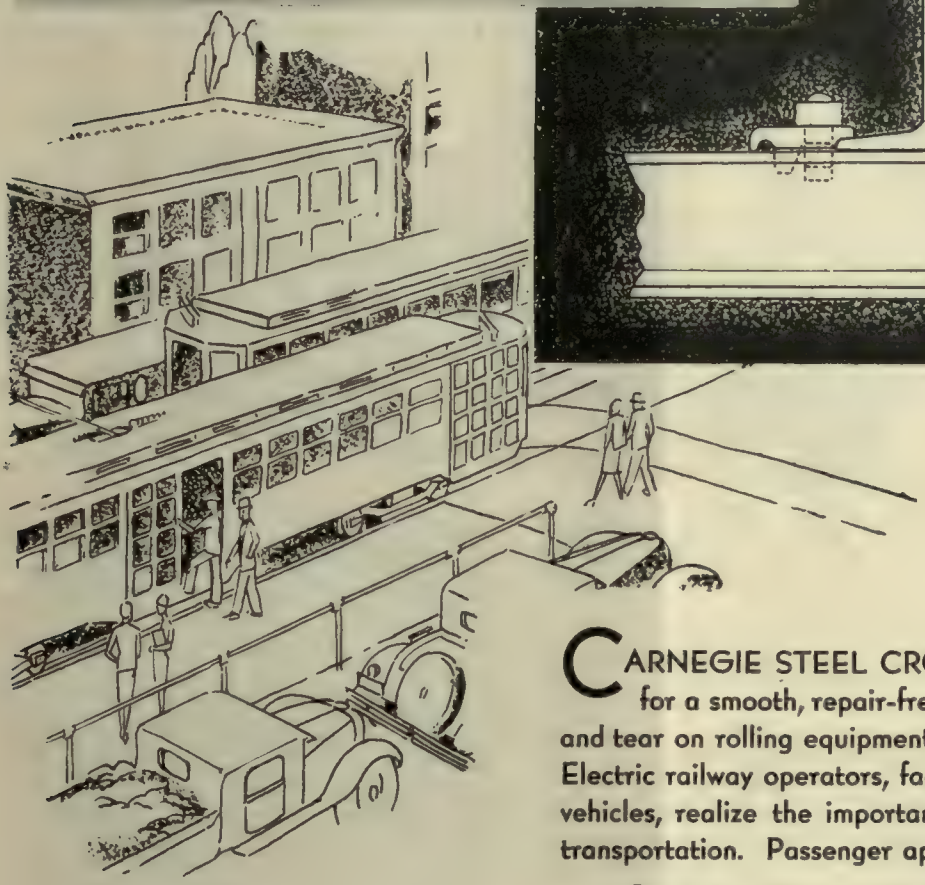


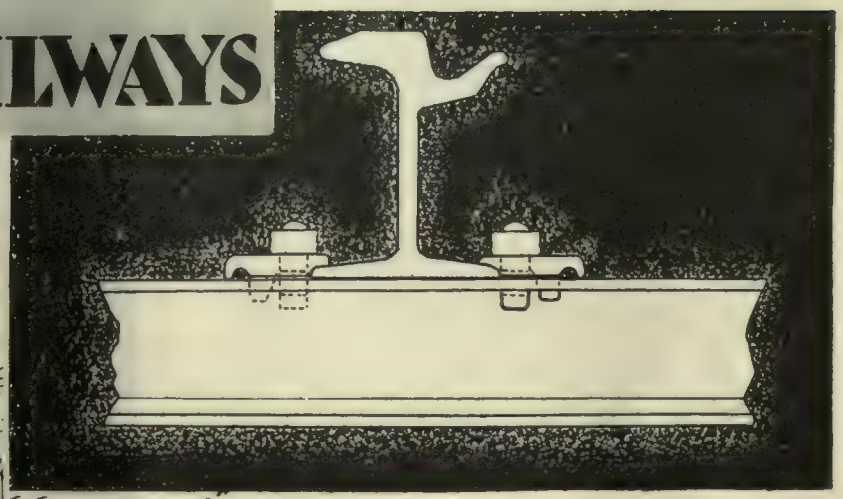
LONG PRODUCTS
AUTOMOTIVE CLUTCHES
AND RADIATORS

LONG MANUFACTURING CO.
DETROIT MICHIGAN

LONG

CROSS TIES *for* STREET RAILWAYS





CARNEGIE STEEL CROSS TIES provide the foundation for a smooth, repair-free track — a track that saves wear and tear on rolling equipment and greatly enhances its comfort. Electric railway operators, facing the competition of automotive vehicles, realize the importance of providing safe, comfortable transportation. Passenger appeal begins with the track.

Carnegie Ties are easily installed. The bolt and clip by which the rail is secured are simple and efficient. The unit cost (cost per foot of track per year) is considerably less than for wood ties.

Plan to include Carnegie Steel Cross Ties in your 1930 track construction program. It will prove to be an investment that pays dividends—particularly in passenger satisfaction.

CARNEGIE STEEL COMPANY

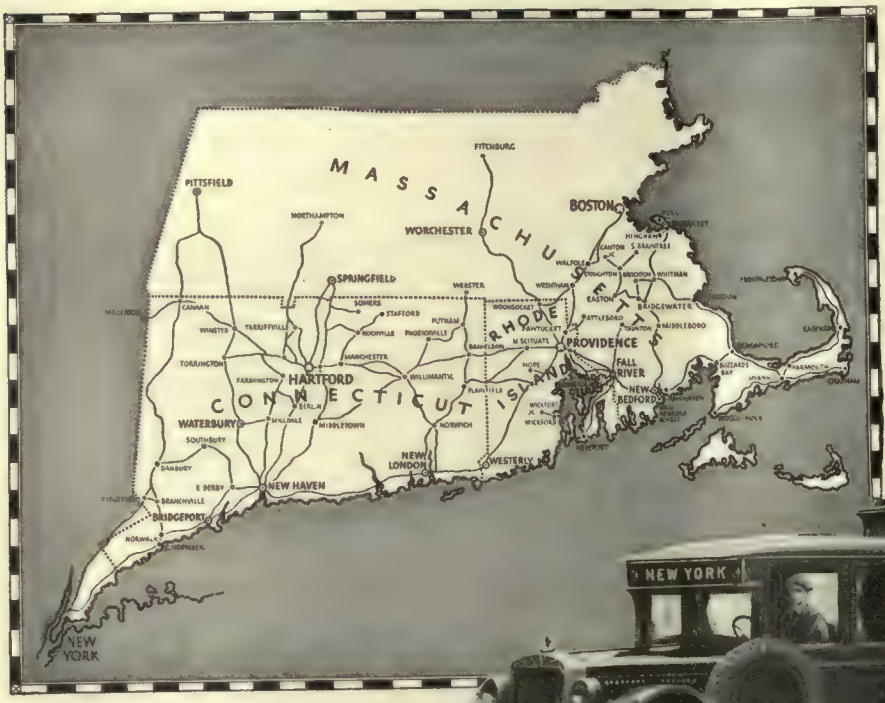
Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

45

CARNEGIE

STEEL CROSS TIES



For the fifth straight year, the New England Transportation Company is using U. S. Tires. 1930 finds all of its more than 280 vehicles on the new U. S. Royals.



OFFICIALLY OK'D
by Leading Bus Fleets

The new year brings still greater success . . . more widespread endorsement of the new U. S. Royal Heavy Service . . . both Balloon and High Pressure.

Millions of tire miles a month are demonstrating its trouble-free, *on-schedule* performance and the added gripping power of its wide, deep tread and buttressed shoulders.

It is a matter of record that every prominent bus line which used these tires in 1929, has officially ok'd them as standard equipment for 1930.



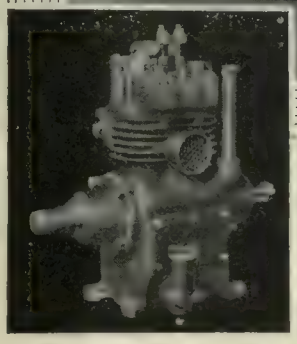
UNITED STATES RUBBER COMPANY

US RUBBER

World's Largest Producer of Rubber

Safety is but one feature of modern air brake control





The heart of the air brake, this dependable compressor is one of the type which furnishes air for the Westinghouse Automotive Air Brake and is standard equipment on all A. C. F. coaches.

The Westinghouse Automotive Air Brake is coming more and more to be known not alone as a safety device . . . but as one of the most important units of economic necessity in modern coach operation.

Westinghouse Automotive Air Brakes have enabled thousands of coach operators to increase schedule speeds. The results are obvious—better service, more passenger loads and greater profits. The fact that Westinghouse control assures perfect equalization of braking force at all times is also a feature of no small importance. Skidding is minimized . . . brake adjustments are less frequent and lining life is lengthened materially.



A tuned combination of the Pneuphonic Horn, a unique warning signal designed especially for the modern motor coach by Westinghouse engineers. This unusually effective signal operates from the same air source as the Westinghouse Automotive Air Brake.

The Westinghouse braking system also furnishes an air supply for the operation of various pneumatic devices such as warning signals and door control mechanisms.

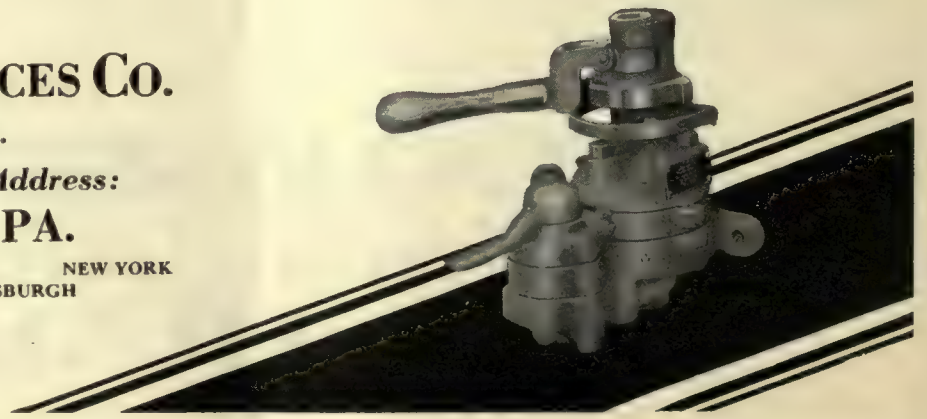
The far reaching advantages of Westinghouse Automotive Air Brakes are more fully outlined in several recent publications which may be had by addressing the WESTINGHOUSE AIR BRAKE COMPANY, Automotive Brake Division, Pittsburgh, Penna.

WESTINGHOUSE
Automotive
AIR BRAKES

The SAFETY CAR CONTROL EQUIPMENT

~ PROVIDES Greater Convenience

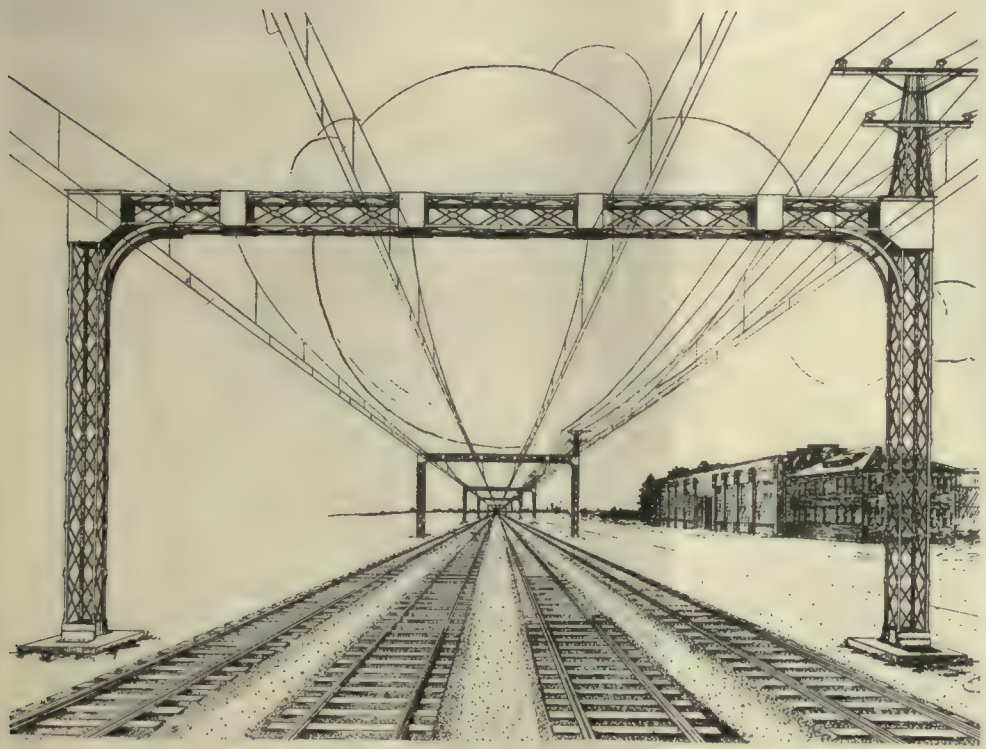
INTERLOCK of brakes with doors, by means of a common operating valve, simplifies manipulation, and the selective door control feature, which permits treadle control of rear exit, insures prompt and flexible passenger interchange under varying traffic conditions.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
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WASHINGTON PITTSBURGH

Walter Bates Steel

EXPANDED SQUARETRUS





SQUARETRUS Construction—

for Strength, Appearance, Economy, Efficiency

More lbs. of strength for lbs. of weight than any other design.

"SQUARETRUS" Poles are made from four main pieces. Each corner leg angle is intact with one set of expanded lacing. Erection of structures is obviously a simple matter, easily kept at a minimum expense.

Very few bolts; examine the cut carefully for detail of construction. Tabulated data gladly furnished.

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WALTER BATES
FLOOR GRATING
SUBSTATIONS
TOWERS
POLES

WALTER BATES STEEL CORPORATION

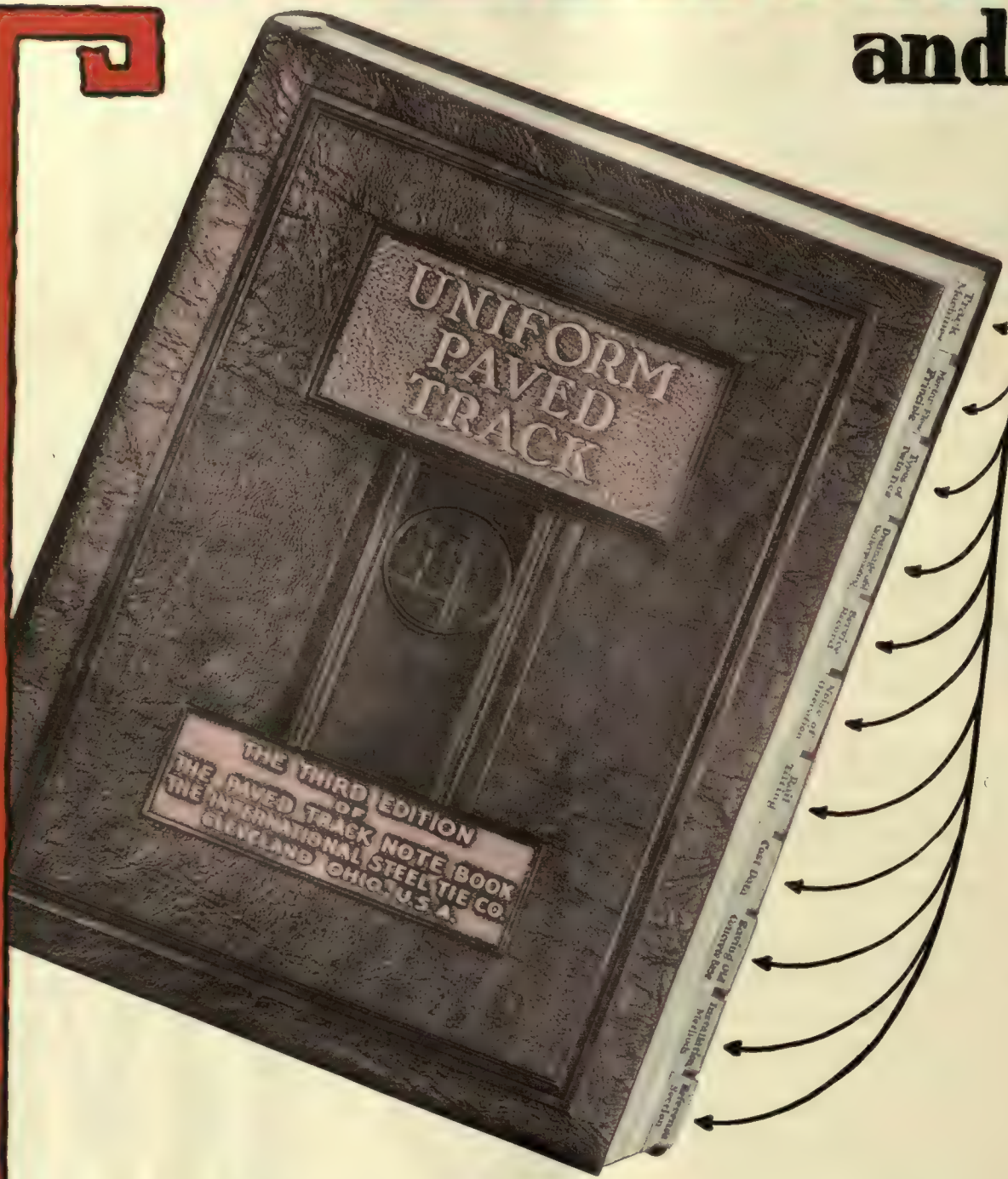
GARY INDIANA

See our advertisement in the January 4th issue of Electrical World, Pages 250-251.

Let us hear from you—you will promptly hear from us.

THE GREATEST SINGL

and Data



THE INTERNATIONAL STEEL TIE COMPANY

16702 WATERLOO ROAD, CLEVELAND, OHIO

SOURCE OF FACTS • • •
on Paved Track Construction

Now Ready To Mail
Third Edition of the Paved Track Notebook
"UNIFORM PAVED TRACK"

IN three short years, the Paved Track Notebook has become recognized as the greatest single source of facts and data on modern paved track construction utilizing steel ties.

"Uniform Paved Track" is the title of this new, enlarged Third Edition.

In it previous data is brought up to date. The addition of a wealth of new material makes this handbook 25% larger, more interesting, more useful.

The Mortar-Flow Principle, the improved method of concreting paved track with the revolutionary "Mortar-Flow Pulsator" is fully explained. Exact details of how best to install compressed concrete paving, and of how to use the new vibrated grout method of construction for early service are given.

Research Results on concrete and steel bond are presented for the first time anywhere.

Modernized Twin Ties with the new "Precision" Rail Clip—which is sawed and drilled, *not* punched and sheared—and *heat treated* bolts are completely described.

Two New Types of track construction are shown. Paved track design is discussed from the Executive's viewpoint.

Unit Pressures on the subgrade with concrete foundation and stone ballast are compared.

A New Section has been added on the important subject of waterproofing the track structure and subgrade drainage.

INITIAL COST COMPARISONS are given for typical installations. A table of units of track work per man hour on over 60 miles of track, permits application of this data to your local conditions.

A Reference Section with notes on concrete, and a convenient table of cubic contents of typical track trenches completes this remarkably informative "Uniform Paved Track" Notebook.

Every Railway man who has to do with paved track will want a copy of "Uniform Paved Track." Offered in three bindings: De Luxe, Leather covered, permanently bound, for executives; a leather covered, loose leaf ring book for engineers; for general use, a loose leaf leather folder with clips.

Your copy awaits your request. Mail the coupon—now!

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Plowman lifts his head



WITH bare hands, the plowman fought for his food. Hunger harried him . . . bent his back, bowed his head.

Then the machine . . . freedom . . . time to cultivate his fellows as well as his fields . . . to live, to think, to be.

Industry gave every man a hundred hands . . . farms produced more with less men. Millions of workers flowed from farm to factory. Swiftly industry expanded, became complex.

As the pace grew faster there was a vital, growing need for the interchange of experience. Men of industry had to keep constantly informed of Industry's activities and progress . . . of the current news and developments in their own specialized fields. Out of these needs came the industrial press—the McGraw-Hill Publications.

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THE automobile or truck may gas pedestrians with impunity—but you cannot permit your motor coaches to do so. You can't afford to antagonize these potential patrons by subjecting them to stifling fumes.

If your motor coaches are releasing objectionable fumes, try Red Crown Gasoline and Polarine Motor Oil. The sulphur and impurities that are present in many fuels and lubricants and which are a major cause of obnoxious combustion odors, have been reduced to a minimum in Red Crown and Polarine.

Red Crown Gasoline and Polarine Motor Oil form an ideal combination . . . a gasoline that gives power, mileage and complete combustion . . . a motor oil that is pure and rich, supplying thorough, efficient lubrication to the motor. Working together they give that perfectly balanced performance which insures efficient service and low cost operation.

Have our engineers make a test of Red Crown and Polarine in your motor coaches and let the result speak for itself.

STANDARD OIL COMPANY
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RED CROWN GASOLINE

POLARINE MOTOR OIL

WARNING!



..CAN YOU AFFORD TO SUPPORT OLD AGE ?

IF NOT..

. . . modernize



DODGE BROTHERS

for lower costs with Dodge Coaches

THERE COMES A TIME WHEN BURDENSOME MAINTENANCE COSTS MAKE REPLACEMENT AN ECONOMY

Operators, large and small, are discovering this simple truth: It is more economical to replace old equipment than to continue using it with resultant high maintenance costs.

Dodge Coaches are built for modern service requirements — the Street Car Coach is of the 21-passenger type, the Parlor Coach seats 16 passengers. Their dependability is acknowledged by experienced operators. Their economy in operation and maintenance is conclusively proved. Their comfort and fine appearance attract and hold the preference of riders.

Your maintenance costs may now be excessive. Lower them by replacement with modern, economical Dodge Coaches.



MOTOR COACHES



. . AND YOUR MAINTENANCE COSTS WILL CONTINUE LOW BECAUSE A DODGE BROTHERS DEALER— ONE OF YOUR REPUTABLE LOCAL BUSINESS MEN— CARRIES AN AMPLE STOCK OF REASONABLY PRICED REPLACEMENT PARTS . . .

DODGE BROTHERS
MOTOR COACHES

Around the World 4000 TIMES on FISK TIRES

THE FISK method of Engineering Analysis on motor coach operations, different from all others, is so fundamentally sound—and Fisk Tires are so markedly superior—that the trend to Fisk has become a procession. Some of the country's largest bus operations will travel 100,000,000 miles on Fisk Tires during 1930.

Operators of great coach fleets—railroads, street railways and other big bus systems—don't buy tires out of habit or friendship. With public favor and company profits at stake, their purchasing agents measure values with the most exacting yardsticks.

They search the whole tire field...invite solicitation by competing tire builders . . . examine tires, figures, records. Then they choose—and the trend to Fisk has become a procession! Why?

Fisk Transportation Engineers study every tire equipment problem and supply the *right tires* for each coach, each route, each transportation job. Fisk's nearby service stations co-operate 52 weeks a year.

Fisk actually *lowers tire costs per mile.* Because Fisk shows an overwhelming record for *tires that give uninterrupted service.*





THE FISK TIRE COMPANY, INC.
Commercial Tire Department
CHICOPEE FALLS MASS.

mileage FISK



WAR + + + ON THE RED

THE ONLY RED WORTHY OF THE FEAR of modern business is the baleful red that glows from figures written in scarlet ink, silently flashing the news of wastes that eat up profits, of excessive costs and inadequate returns. They are the figures of defeat. The world of business rightly hates these red figures. It wages against them a war without quarter, bitter and implacable.

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In every field of industry or trade where there is a live business press a barrage of fact is being fired against wasteful practices. Production costs crumble daily under its drumfire of information on machines, materials, technique and management. Distribution costs are coming in for their share of pounding. The business paper as the attacking arm of business progress is out to do away with the things that eat up profits. The Reds must go.

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Armature Shafts

Springs and Axles

What is it that you desire in wheels?

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FABRICATED STEEL STRUCTURES

for every purpose

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Fabricated Structural Steel by AMERICAN BRIDGE COMPANY

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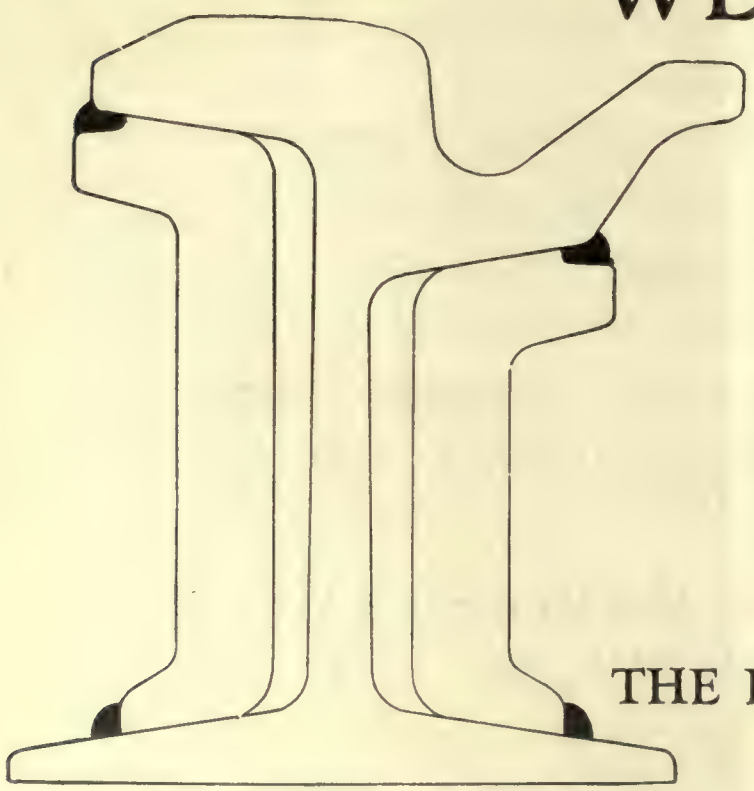
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For EFFICIENT, ECONOMICAL

JOINTS

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"Weld Plates" represent the most modern welding practice. They are the strongest and most up-to-date plates rolled especially for electric welded joints. Note the shape—the grooves for retaining plenty of weld metal along the upper edges—the wide contact areas at top and bottom—the suitability for the use of short bolts.

A trial will convince you of their efficiency and economy.

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165 Broadway, New York

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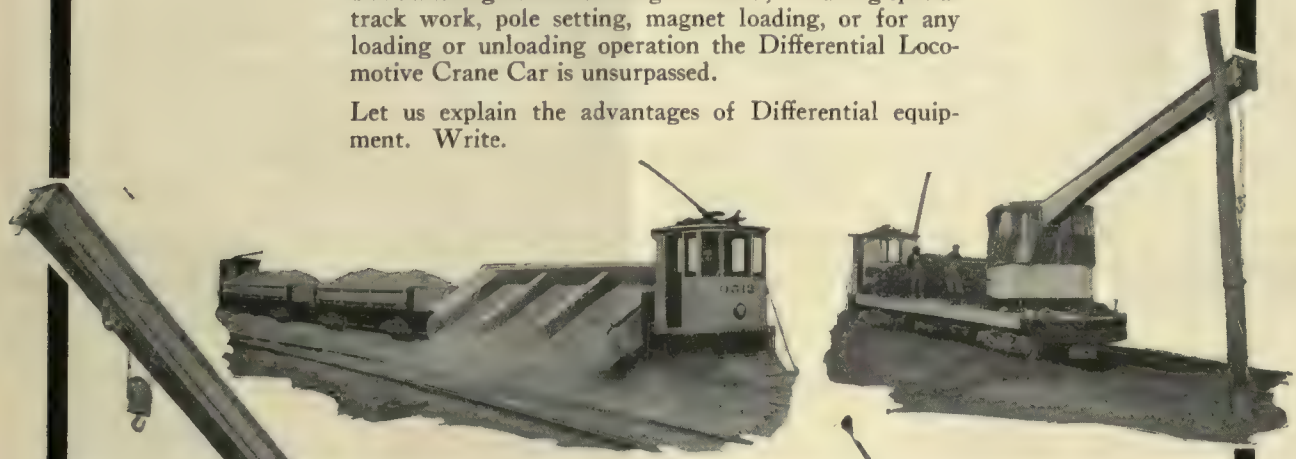
That Better Track Construction

DIFFERENTIAL Dump Cars, Differential 3-way Truck Bodies, Clark Concrete Breakers, Differential Electric Locomotive Crane Cars — are accessories to better track laying methods, better track, lower costs.

Take, for example, the Differential Electric Locomotive Crane Car. One man from a revolving turret controls the car movement and four distinct crane movements. It is fast and safe. It conforms to Electric Railway clearances. Does not block traffic on adjacent tracks.

For handling rails and bridge timbers; for doing special track work, pole setting, magnet loading, or for any loading or unloading operation the Differential Locomotive Crane Car is unsurpassed.

Let us explain the advantages of Differential equipment. Write.



The Differential Steel Car Co.

Findlay, Ohio, U. S. A.

Differential Electric Locomotive Crane Car

Capacity: Five tons at radii up to 26 feet, two tons at radii from 26 feet to 44 feet.

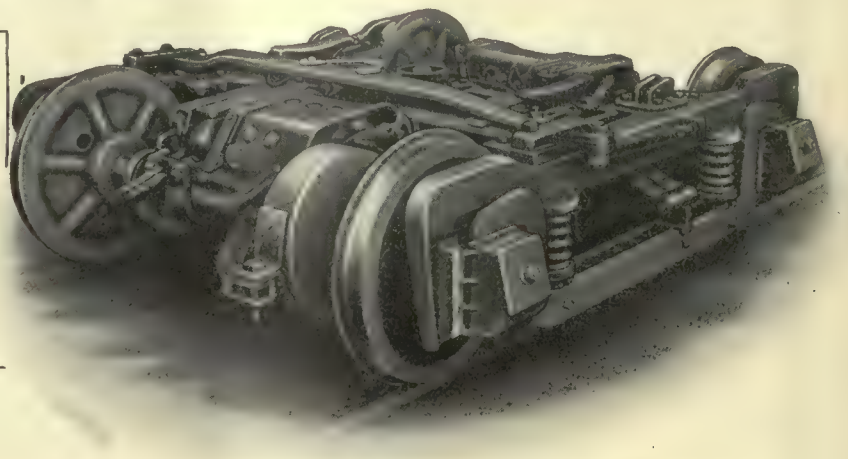


Commonwealth Trucks

cut operating costs

Cast Steel Frame, including cross and end transoms, a single unit.

Pedestals cast integral with frame, protected from wear by renewable hardened spring steel liners.



(PATENTED)

The Commonwealth Street Railway Truck illustrated above has given years of satisfactory service with maintenance costs practically eliminated. The unsurpassed performance records of this and other Commonwealth Trucks are responsible for their use by many leading railways.

General Steel Castings Corporation

Commonwealth Division GRANITE CITY, ILLINOIS

Small Parts . . .

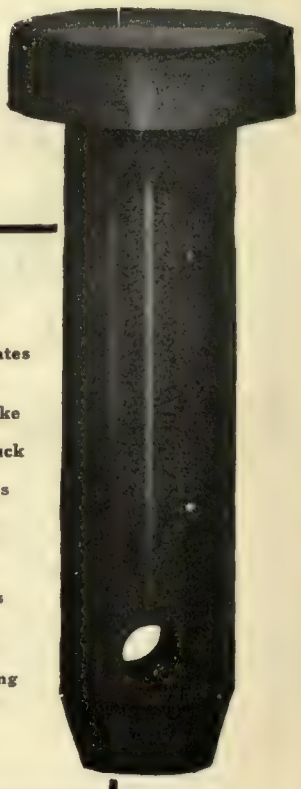
With large responsibilities

Small parts though individually inexpensive, can become, if frequently replaced, a major item of expense. Replacement involves not only cost of parts but also that of labor and of "time out" for rolling stock.

The responsibility for keeping these costs down is often overlooked when purchasing small parts. Boyerized parts are specially made to shoulder this responsibility.

Their slight additional cost over ordinary parts justifies itself through longer service. By charging a little more, the manufacturer is able to use the best materials, give more attention to design, and to use the famous "Boyerizing" heat treating and hardening process which ensures three or four times longer life.

It pays to specify them, and to insist on getting them.



- Spring Post Bushings
- Spring Posts
- Bolster and Plates
- McArthur Turnbuckles
- Manganese Brake Heads
- Manganese Truck Parts
- Bronze Bearings
- Brake Pins
- Brake Hangers
- Brake Levers
- Pedestal Gibs
- Center Bearings
- Side Bearings
- Case Hardened Bushings
- Transom Chafing
- Brake Fulcrums
- Forgings
- Trolley Pins

BEMIS CAR TRUCK COMPANY

ELECTRIC RAILWAY SUPPLIES

SPRINGFIELD, MASS.

Representatives:

F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 56-60 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Building, Los Angeles, Cal.

BOYERIZED PARTS

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

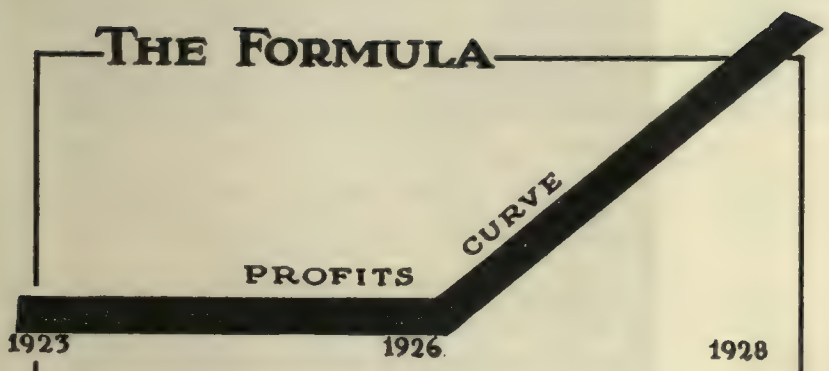
PATENTS EXPIRING!

what'll we do?
what'll <u>others</u> do?

BASIC patents on a machine used extensively by a specific industry were owned by the ABC Corp.

The XYZ Co. also made the machine, along with other products, paying the ABC people a royalty for every machine sold. The XYZ Co. chose to stay in business without making a practical profit on this particular product. *Why?*

Two years or so ago the patents expired. The expected happened. Dozens of manufacturers turned to making the machine. But instead of diminishing sales for the XYZ Co., there came increased sales, pyramiding profits and leadership in the field. This leadership is being maintained today by the same formula that was used steadily for three years before industry-at-large was free to make the machine.



During this three-year period, when XYZ's profits were barely enough to pay the patent owners, XYZ advertised regularly in McGraw-Hill Publications—building recognition for the future—intrenching themselves in a strategic position for the *post-patent period.*

Pyramided effects of continous industrial advertising sent sales and profits constantly upward after patents expired. A sustained advertising program of full and double pages, with pithy, factful copy, is keeping the XYZ Co. in top place. A clear-cut victory—not so much for McGraw-Hill publications but for Industrial Advertising strategically applied.

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St. Louis
Greenville San Francisco Boston London

F-15

TEXACO OFFERS A NEW LUBRICATION



The New Texaco Leather Oil Seal



Cut of journal box on which Texaco Oil Seal and Texaco Lovis Oil have been used for three years. This is a type of journal box in use on equipment of The United Railway and Electric Co., Baltimore, Md. Note clean, resilient waste still saturated with Texaco Lovis Oil.

Electric railway car journal lubrication has been revolutionized. Power losses have been substantially reduced. Bearings, journals and waste can now be effectively protected from abrasive dust and water and effectively lubricated.

The new Texaco Oil Seal and Texaco Lovis Oil are accomplishing what was formerly regarded as impossible. Texaco Oil Seals are being installed on many of the country's leading roads.

This new Texaco Lubrication has aroused the interest of the entire electric railway industry. It is something with which every railway executive should be familiar.

Tests will gladly be arranged by Texaco engineers at the request of any operating executive. Write The Texas Company.

TEXACO

REG. U.S. PAT. OFF.

THE TEXAS COMPANY

Dept. L, 17 Battery Place, New York City

Offices in Principal Cities

TEXACO LUBRICANTS



STRONG TO BEAR BURDENS —LIGHT TO MOVE

TRANSPORTATION revolves around 3 things—starting, continuing, stopping-weight. One of the problems is dead weight. It slows up schedules, requires extra power to move, takes its toll of profits.

Today, thanks to light, strong Alcoa Aluminum alloys, dead-weight's menace is diminished. Car-bodies, structural members, trucks, are being made of *equal strength—with less than half the weight.* Dead-load is transformed to pay-load. Result—better service with substantial power-savings, faster schedules, reduced maintenance-of-way expense.

ALCOA ALUMINUM

ALCOA

$$E = \frac{MV^2}{2}$$

Cleveland Street Railways Carry Loads That Pay Instead of Prey

Cleveland, the first to use Alcoa Aluminum strong alloys, to banish old-fashioned heavy metals; the first to step out from under the menace of dead-weight—reduced the weight of a car by 12,900 pounds. Cleveland found that Westinghouse 50 H. P. could be replaced by 35 H. P. motors, that the weight of the motors consequently was reduced 660 pounds. Schedules were speeded up; lubrication costs reduced; power costs cut in direct proportion to the weight saved.

Cleveland quickly discovered that the same car covered more territory, attracted more riders, stayed out of the shop longer, and did all this at a much lower operating cost because it carried a load that paid—instead of preyed on power and profits.

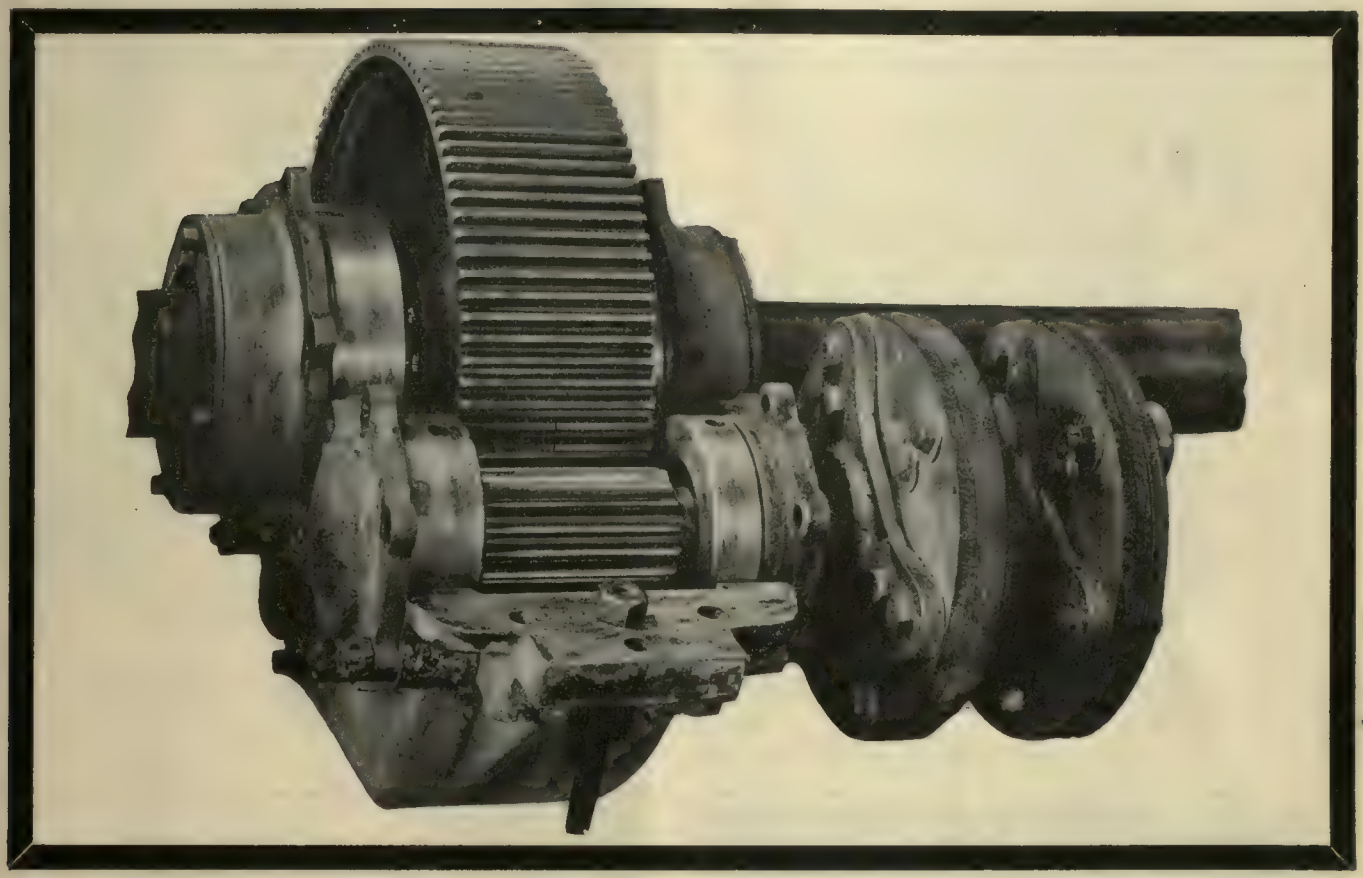
Our engineers will be glad to consult with you upon the practical application of Alcoa Aluminum strong alloys in transportation.

ALUMINUM COMPANY *of* AMERICA, 2463 Oliver Building, PITTSBURGH, PA.
Offices in 19 Principal American Cities



ALCOA ALUMINUM

"TOOL STEEL" SINGLE REDUCTION UNIT



A REVENUE BUILDER —A COST REDUCER

SMALL, light and compact—utilizing fully the advantages of the light, high speed motor—this single reduction unit has proven more than an efficient drive.

It is a sales influence—a powerful factor in increasing patronage. It holds present riders—gains new ones—by assuring faster running time—quick pick-up and noiseless operation.

3,000 lbs. per car reduced weight compared with conventional motor drive.

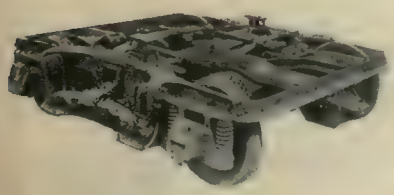
A single spur gear, a pinion and a flexible coupling of proven design makes up the unit. It is simplicity itself.

Fifteen months of trouble-free service has proved its dependability. Carefully conducted tests have shown no measurable wear on gear, pinion or bearing surfaces. The long life qualities of this remarkable drive reduces maintenance cost to a minimum.

Meeting the need for faster car movement and shorter schedules this drive unit merits your investigation.

We shall be glad to send you the complete story.

REDUCTION UNIT
MOUNTED IN TRUCK



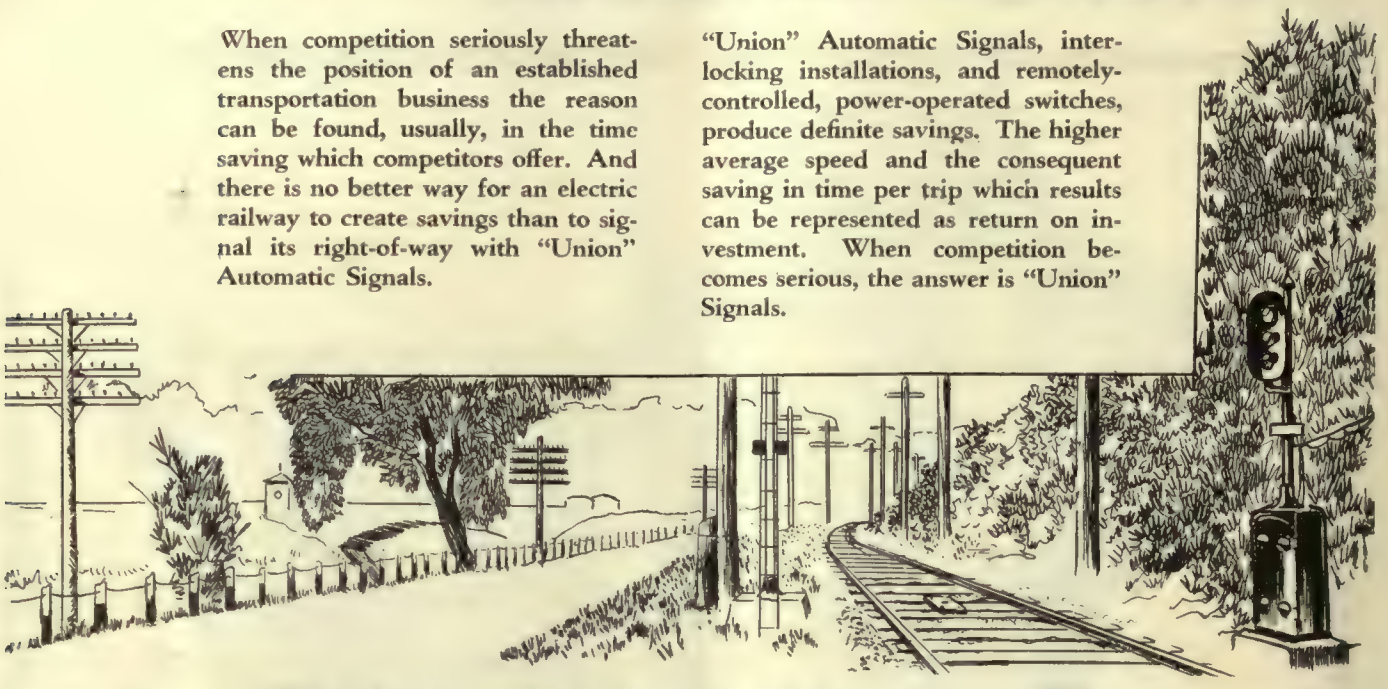
THE TOOL STEEL GEAR & PINION CO.

Cincinnati, Ohio

WHEN COMPETITION BECOMES SERIOUS

When competition seriously threatens the position of an established transportation business the reason can be found, usually, in the time saving which competitors offer. And there is no better way for an electric railway to create savings than to signal its right-of-way with "Union" Automatic Signals.

"Union" Automatic Signals, interlocking installations, and remotely-controlled, power-operated switches, produce definite savings. The higher average speed and the consequent saving in time per trip which results can be represented as return on investment. When competition becomes serious, the answer is "Union" Signals.



1881 **Union Switch & Signal Co.** 1930

SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

Look to your seats for rider comfort

For better seats mean more riders. This fact is recognized by the many operators who specify General Leathers.

Clean, neat, easily washed, durable—and always attractive.

Specify General Leathers on your next order for Electric Cars, Buses and Taxi-Cabs—Send for samples:

Majestic Full Grain Leather
20th Century Spanish Leathers
Genleaco Leathers
Salon Hand Buffed Leathers

General Leather Co., Newark, N. J.

Makers of the
Famous Tried and Proven "00" Leathers

Detroit Office:
Stoddard Lovely & Co.,
10-219 General Motors Bldg.

West Coast Office:
A. J. & J. R. Cook, Inc.,
237 Eighth St., San Francisco

London Office:
R. & A. Kohnstamm, Ltd.,
21 West Smithfield,
London, E. C.

Canadian Office:
Colonial Traders, Inc.,
78 William St., Chatham, Ont.

PANTASOTE

TRADE MARK

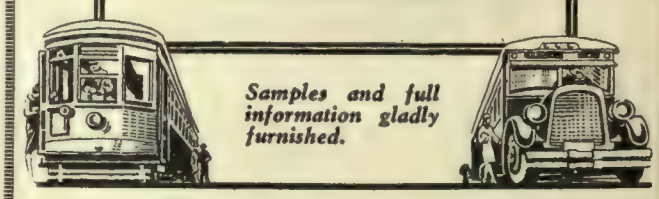
—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

TRADE MARK

—the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

Standard
for electric railway cars
and motor buses



Samples and full information gladly furnished.

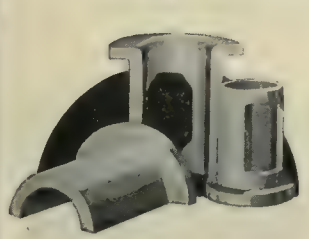
The PANTASOTE COMPANY, Inc.
250 Park Avenue NEW YORK

THE Proper
Quality and Design
FOR YOUR NEEDS

National products are the result of intensive specialization. Practical and economical in service, they fully meet the requirements of modern electric railway operation. Their advantages can be quickly proven by a trial. Prices and full details submitted upon request.



Trolley Wheels and Harps



"Tiger" Bronze Axle and Armature Bearings



Armature Babbitt Metal

National Bearing Metals Corporation
ST. LOUIS, MO.

JERSEY CITY, N. J.
PORTSMOUTH, VA.
NEW YORK, N. Y.
ST. PAUL, MINN.
PITTSBURGH, PA.
MEADVILLE, PA.



The Sullivan line of Vibrationless Portable Compressors includes 66, 110, 160, 220, and 310-ft. gasoline models; 120, 175, 240, and 350-ft. electric models; on steel wheels, trailer trucks, or skids.

Sullivan adds the 66-ft. Vibrationless Compressor

Vibrationless Portable Compressors have given a new meaning to dependable air power service.

So popular have these Vibrationless Compressors become, that Sullivan Engineers have now added the 66-foot size to the Sullivan line.

You will find this new compressor a real profit maker on small jobs of rock drilling, spray painting, concrete or asphalt cutting, clay digging, tamping, riveting, calking, cleaning—wherever a small amount of work is to be done with air, or where tools will be run intermittently.

Details of the new Vibrationless Compressor

The 66-foot "WK-312" has two cylinders 4¾ x 4 inches—is run by an 18 H.P. engine, and is good for 100 lbs. pressure.

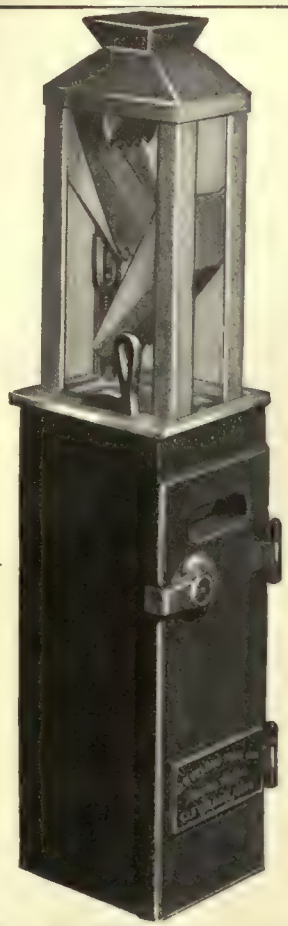
It may be mounted on steel wheels (wt. 2500 lbs.) spring mounting with rubber tires; skids or two-wheel trailer.

Standard Sullivan Equipment includes: American Bosch high tension magneto and impulse starter, Zenith carburetor, Pierce Governor, Sullivan slow-down governor, pilot valve unloader, Imperial engine primer, and AC Filters.

Vibrationless Compressor Catalog, No. 83-F

SULLIVAN AIR POWER EQUIPMENT

SULLIVAN MACHINERY CO.
809 Wrigley Building, Chicago, Ill.



As Efficient as It is Simple

The Cleveland Fare Box meets every modern fare collection need — without depending on a complicated, involved system for its efficiency.

It is fitted for any rate of fare or system—handles zone fares as readily as unit fares.

Once installed a Cleveland Fare Box never becomes "obsolete"—it meets any change—accommodates fractional fares, flat fares, either paper or metal tickets.

The Cleveland Fare Box Co.

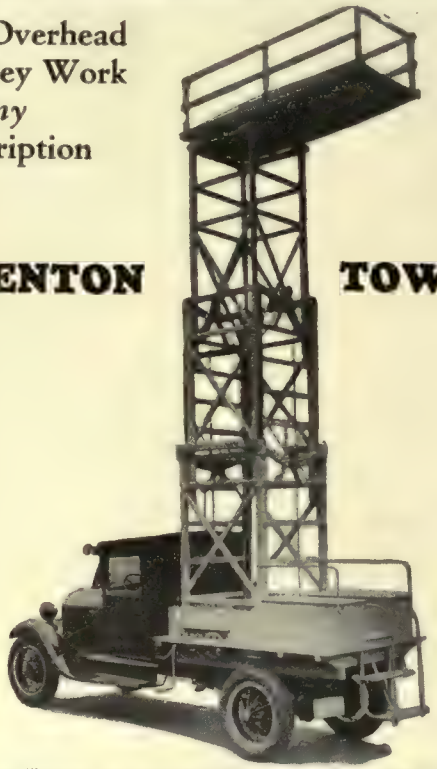
4960 Lexington Ave., Cleveland, Ohio

Canadian Cleveland Fare Box Co., Limited, Preston, Ontario

"4-Way" Padlocks, Coin-Auditing Machines, Change Carriers, Tokens

For Overhead Trolley Work *of Any* Description

TRENTON TOWERS



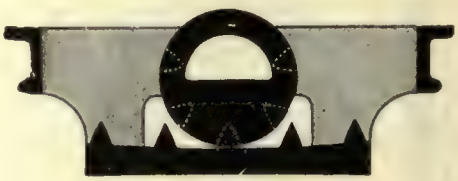
Trenton Towers are universally known as the safest, fastest and most practical method of bringing overhead construction within working range.

They are economical to operate and provide safe, easy working conditions for line men. Indispensable for rapid repairing of pole type equipment, braces, trolley wires, traffic signal lights. Gas or electric chassis. Will be glad to send a catalog. Write.

J. R. McCARDELL & COMPANY
391-401 SOUTH WARREN ST., TRENTON, N. J.

STUCKI SIDE BEARINGS

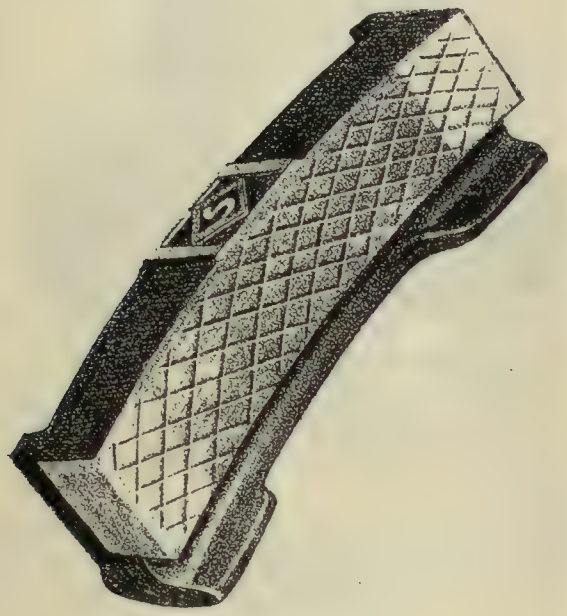
SPECIAL CARBON STEEL
HEAT TREATED



LARGE WEAR SURFACES
FREE ROLLER
ONLY TWO PARTS

A. STUCKI CO.
OLIVER BLDG., PITTSBURGH, PA.

Better Brakes Need Better Brake Shoes



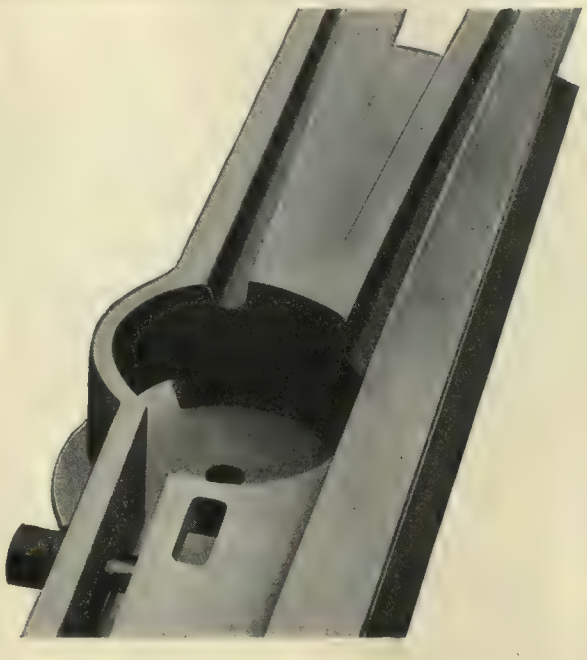
IMPROVEMENT of trolley-car schedules in urban service involves faster starts and quicker stops and has made the redesign of braking systems imperative. The new brakes now being advocated work faster and more powerfully than any systems hitherto used.

These improved brake mechanisms vastly increase the strains upon brake shoes due to higher speeds, quicker application and heavier pressures. They should be equipped with Diamond-S brake shoes, the features of which keep them in operation long after ordinary brake shoes have worn out.

The American Brake Shoe and Foundry Company

230 Park Ave., New York

332 So. Mich. Ave., Chicago

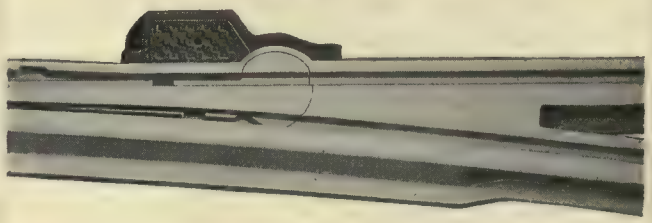


A NEW WHARTON CONTRIBUTION *to the industry*

The Wharton Flexible Wall Switch has a heel tightening device based on the principle of a split collar. By means of a bolt the wall is flexed or drawn in until it hugs the tongue heel; thus all play caused by wear is taken up. The nut of this bolt is located in the drain box and is readily accessible.

The tongue pin is 9½-in. in diameter and 6-in. deep. This construction eliminates a holding-down device, prevents kick-up and forward movement of the tongue.

We can help you on trackwork layouts whether complicated or simple. Write.



Wm. WHARTON Jr. & COMPANY, *Inc.*

EASTON, PA.

News

brief, late news flashes for the electric railway industry

To supplement the service of the regular monthly issues of *Electric Railway Journal*, a separate NEWS service appears on thirty-nine Saturdays during the year. This supplement keeps you in touch with court decisions . . . fare increases . . . new ordinances . . . association meetings . . . financial statements . . . equipment purchases.

Subscription Price: For all countries taking domestic subscription rate, $2 per year.

ELECTRIC RAILWAY JOURNAL
475 TENTH AVE.
NEW YORK CITY

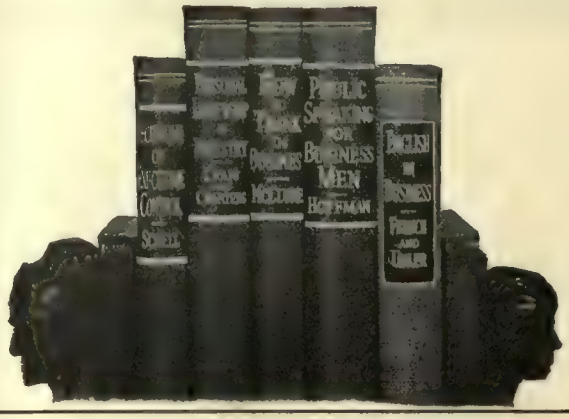
Enter my subscription to the Electric Railway Journal *News*. Bill me for $2.

Name

Address

City State

How to fit yourself for leadership in business



Examine these Five Helpful Books Free!

Craig and Charters—Personal Leadership in Industry.
McClure—How to Think in Business.
Schell—Technique of Executive Control.
French and Uhler—English in Business.
Hoffman—Public Speaking for Business Men.

Library of PERSONAL EFFICIENCY IN BUSINESS

These five practical volumes give you the methods used by successful executives in getting results for themselves in business. They represent actual business conditions—they cover situations exactly the same as you face in your daily work—and they show you clearly and definitely just how these situations can be handled for your own best interests.

They discuss everything the executive must do in taking care of the personal element in his job. They take up business thinking, speaking and writing. They discuss business relations with subordinates, associates and superiors. They cover the executive's handling of his personal self. All of it explained in the light of "getting results." All of it in absolute answer to the question "What makes a good executive?"

5 volumes, 1158 pages $10.75
Easy monthly payments

Send the Coupon Today.

McGRAW-HILL
FREE EXAMINATION COUPON

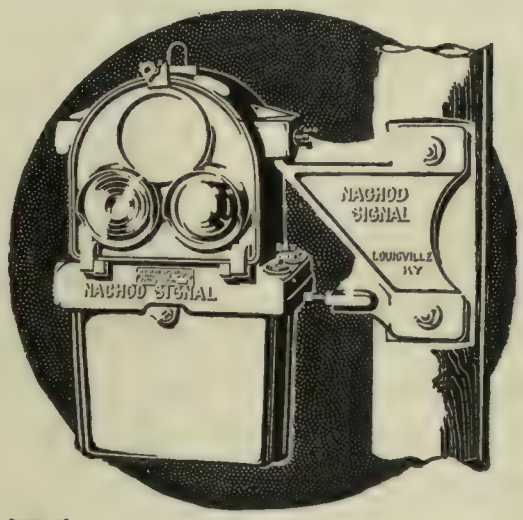
McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

You may send me on approval for 10 days' free examination, the LIBRARY OF PERSONAL EFFICIENCY IN BUSINESS. I agree to return the books, postpaid, in 10 days or to remit $2.75 in 10 days and $2.00 per month for four months.

Name
Home Address
City State
Position
Subscriber to Electrical World?..... Mem. A.I.E.E.?.....
(Books sent on approval to retail purchasers in U. S. and Canada only.)

E. 2-30

Chance and Memory VS. Automatic Control



THERE'S no good argument for operating on chance and memory. Even the argument of lower cost doesn't hold true. Time and again collisions and crashes have demonstrated how costly "Chance and Memory" really is.

Its cost is continuous—you never know when, depending on the human element alone, it will take toll in lives, property and equipment.

With Nachod Automatic Block Signals the first cost gives you the protection. They operate independently of the train crew—chance and memory are out of the picture. At all times these signals insure safe, fast operation—are adapted for single or double track.

Type CD, shown above, for single track, shows when the block is clear or, if occupied, which way the car is moving. On a clear block it tells the motorman when he has set the Stop signal at the other end, shows the car following into the block that it is already occupied, and gives each motorman an indication that he is protected in entering. The system is Permissive, allowing several cars to follow into the same block under full protection.

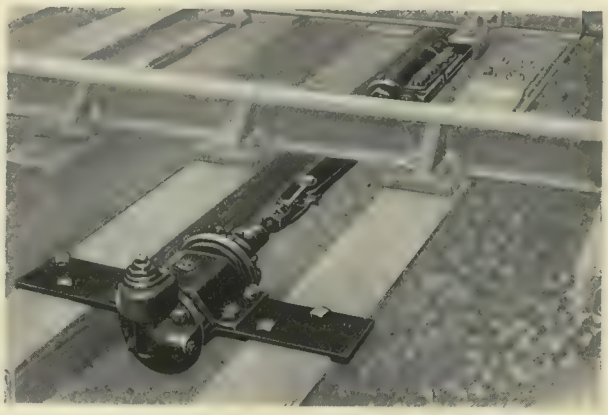
NACHOD SPELLS SAFETY

Today is the day of fast schedules. The industry has found in NACHOD & U. S. Block Signals, the equipment that provides maximum safety under all conditions of operation.

NACHOD & UNITED STATES SIGNAL CO., Inc.

Louisville, Ky.

WE ALSO MANUFACTURE: Turn-right Signals, Signals for Single and Double Track, Stub End Signals, Annunciator Signals, Highway Crossing Signals, Headway Recorders.



Now Built To Work Both Ways

The Racor Oil Cylinder Retarding Dash Pot has long been used to prevent spring-return switch points from being banged to pieces. When the first wheel flange forces the points aside the Dash Pot offers no resistance, but it does retard their return so that following flanges do not strike them hard.

Now this useful specialty is made double-acting. In other words, it may be attached to either side of the switch without special assembling and it permits the switch to be run through from either side, checking the return of the points regardless of their position. Also, the switch may be hand-operated in either direction without interference from the dash pot.

Used in combination with Ramapo Automatic Return Switch Stands it provides ideal control for siding switches.

Behind Racor Service stand nine plants specializing in the manufacture and distribution of railroad track turnout and crossing equipment, including Manganese Work for heavy traffic.

RAMAPO AJAX CORPORATION

RACOR PACIFIC FROG AND SWITCH COMPANY, Los Angeles · Seattle
CANADIAN RAMAPO IRON WORKS, LIMITED, Niagara Falls, Ontario

General Offices – 230 PARK AVENUE, NEW YORK
SALES OFFICES AT WORKS AND
McCORMICK BUILDING, CHICAGO
METROPOLITAN BANK BLDG., WASHINGTON
BUILDERS EXCHANGE BLDG., ST. PAUL

Nine Racor Works
Hillburn, New York, Niagara Falls, N.Y. Chicago, Illinois, East St. Louis, Ill.
Superior, Wis. Pueblo, Col. Los Angeles, Cal. Seattle, Wash. Niagara Falls, Ont.

ALL types of City and Interurban cars of latest design and Modern construction are built by—

CUMMINGS CAR AND COACH CO.

Successors to McGuire-Cummings Mfg. Co.

111 W. Monroe St.
Chicago, Ill.



R 11 Double Register

A Fare Registration System that Gains the Confidence of ALL

The durability, accuracy, speed and convenience of International Registers has given them the nation-wide reputation for efficient service that they have enjoyed for over thirty years.

Electric operation gives the new types even greater speed, accuracy and convenience. Registers can be furnished for operation by hand.

The International Register Co.
15 South Throop St., Chicago



Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870



Dundee "A" Clings

The electrical worker wants a tape that sticks, because it speeds up his job. A tape that is hard to wrap in cold weather makes his work harder.

Dundee "A" fills his requirements nicely because it clings in any weather. It is moderate in price, too, and yet is a true friction tape with the adhesive thoroughly calendered into the fabric under heavy pressure.

THE OKONITE COMPANY

Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC

Factories: Passaic, N. J. Paterson, N. J.

SALES OFFICES:

NEW YORK CHICAGO PITTSBURGH ST. LOUIS BOSTON
ATLANTA BIRMINGHAM SAN FRANCISCO
LOS ANGELES SEATTLE DALLAS

Novelty Electric Co., Philadelphia, Pa.

F. D. Lawrence Electric Co., Cincinnati, O.

Canadian Representatives: Engineering Materials, Limited, Montreal

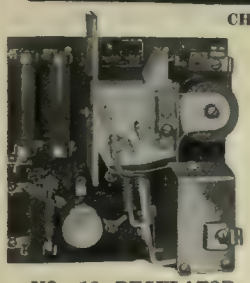
Cuban Representatives: Victor G. Mendoza Co. Havana

Utility Car Heaters fitted with

ENCLOSED HEATING elements carry the Underwriters' Laboratories Label. They give 100% energy output for what you put in.



CHROMALOX STRIP



NO. 10 REGULATOR

UTILITY HEAT REGULATORS economize in current consumption.

UTILITY HONEY-COMB VENTILATORS keep the air pure and wholesome.

Car Comfort with Utility Heaters Regulators Ventilators

RAILWAY UTILITY COMPANY

2241-47 Indiana Ave., Chicago

J. H. DENTON, *Eastern Mgr.*
1328 Broadway, New York



Roebling

Quality Products

Starter and Lighting Cable; Car Wire; Motor Lead Cable; Ignition Cables; Traffic Control Cable; Battery Wire.



Electrode Holder Cable
Electric Welding Cable
Arc Welding Wire
Gas Welding Wire

John A. Roebling's Sons Co.
Trenton, N. J.

ENGINEERS *and* CONSULTANTS

Ford, Bacon & Davis
Incorporated

Engineers

39 Broadway, New York
PHILADELPHIA CHICAGO
SAN FRANCISCO
NEW ORLEANS

STEVENS & WOOD
Incorporated

Engineers and Constructors

60 John Street,
New York
Transportation Examinations and Reports

THE BEELER ORGANIZATION
Engineers and Accountants
JOHN A. BEELER, DIRECTOR
Traffic — Traction
Bus-Equipment
Power-Management
Appraisals Operating and Financial Reports
Current issue LATE NEWS and FACTS free on request
52 Vanderbilt Avenue, New York

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS

EXAMINATIONS
REPORTS-APPRAISALS-RATES
OPERATION-SERVICE

C. B. BUCHANAN, President
W. H. PRICE, JR., Sec'y-Treas.
JOHN F. LAYNG, Vice-President

Buchanan & Layng Corporation

Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance

BALTIMORE
1004 First National Bank Bldg.
NEW YORK
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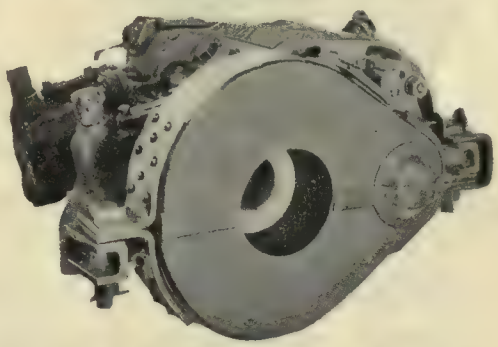
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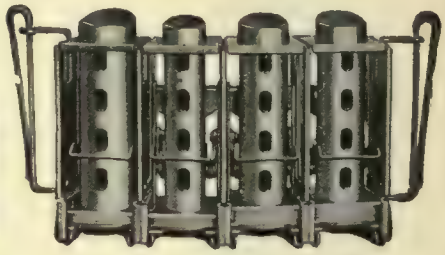


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Industrial Cleaning Materials and Methods

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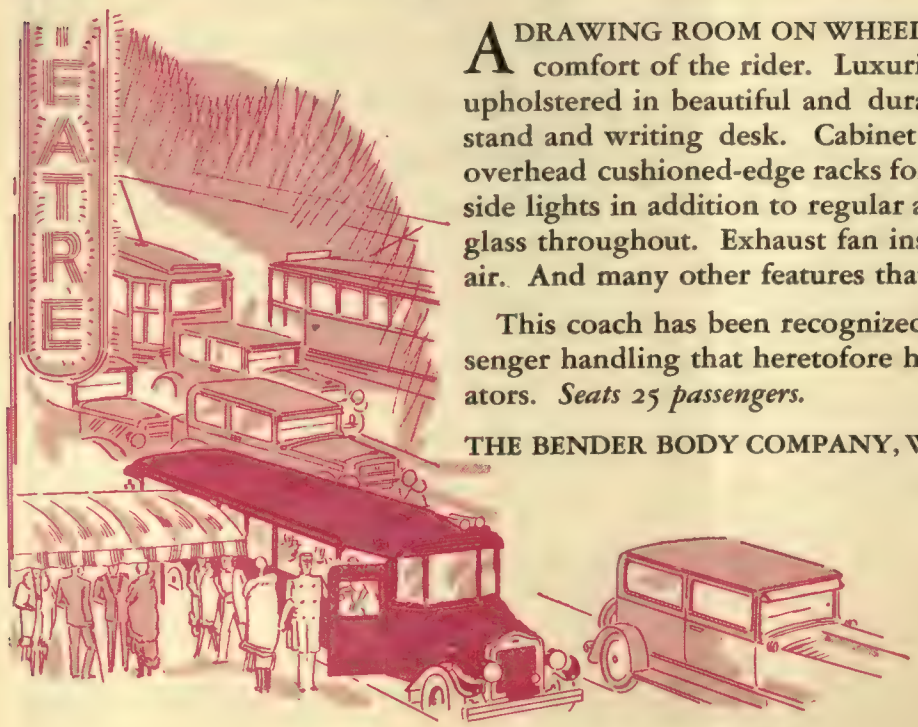
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This coach has been recognized as filling a need for special passenger handling that heretofore has not been available to bus operators. *Seats 25 passengers.*

THE BENDER BODY COMPANY, W. 62nd and Denison, Cleveland, Ohio

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Cleveland Again Selects Brill Cars and Trucks

The one hundred single-end, double-truck city cars ordered by the Cleveland Railway Company from The G. C. Kuhlman Car Company are now being delivered. Like the first order of fifty, these new cars are equipped with Brill Trucks, a significant indication of the dependability of the Brill product.

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blood-albumin glued plywood reduces dead weight in buses

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ELECTRIC RAILWAY JOURNAL

McGraw-Hill Publishing Company, Inc. MARCH, 1930 Thirty-five Cents per Copy



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Twin Coach

The march of Progress



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Vol. 74, No. 3. *Pages 125-178*

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BUILDING MILEAGE *into your armatures*





A Westinghouse Railway Armature Coil.

THE life of a set of armature coils is determined by such factors as, *Condition of Core, Workmanship* and *Type of Service* . . . but the most important factor of all is the *Coils* themselves.

One of the largest interurban operating companies has built up a record during the past few years of rewinding only seven per cent of its armatures a year. It is worthy of note that this traction company uses Westinghouse coils for its Westinghouse motors.

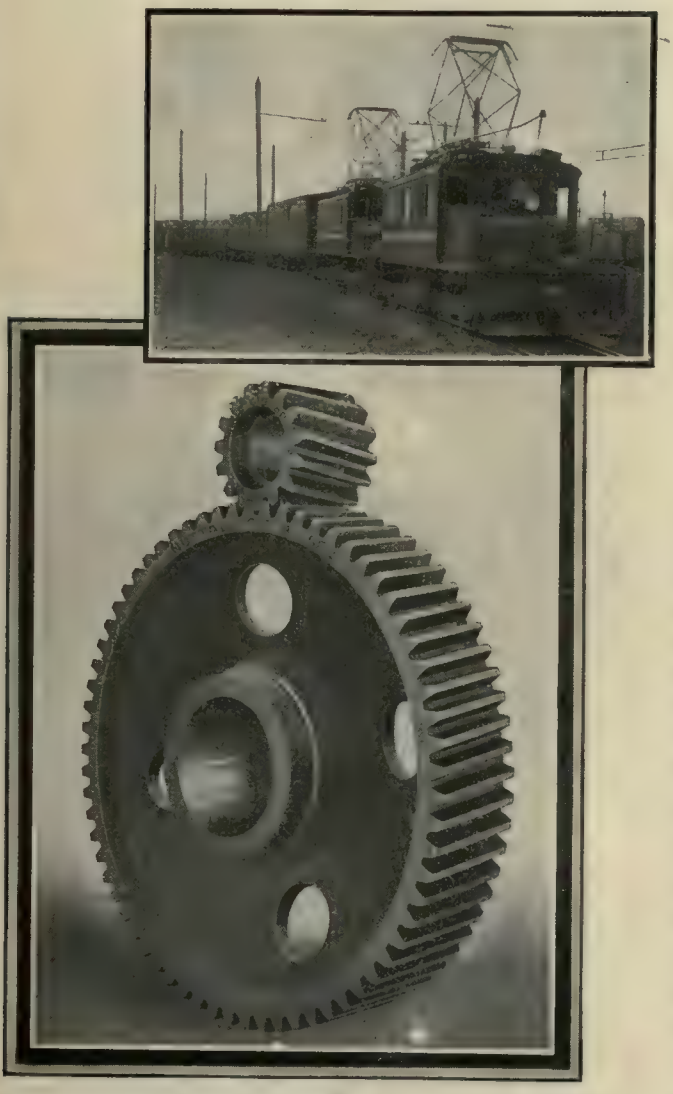
Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

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NIAGARA JUNCTION

Changes to BP HELICAL *gears*



Two of the seven Baldwin-Westinghouse electric locomotives in service on the Niagara Junction line and the BP helical gears with which they are equipped.

SEVERAL years ago, it became necessary to replace the original spur gears on some of the electric switching locomotives of the Niagara Junction Railway, because they were causing excessive noise and vibration which resulted in heavy maintenance costs. With a view to preventing a recurrence of these conditions, the railway company installed Westinghouse-Nuttall BP helical gears.

That all expectations were fulfilled is convincingly evident from the fact that since then the other locomotives on this property also have been equipped with BP helical gears.

Assurance of longer gear life, too, is indicated by the results to date, in spite of the fact that some of the BP spur gears ran from 12 to 24 hours daily, 6 days a week, for sixteen years.

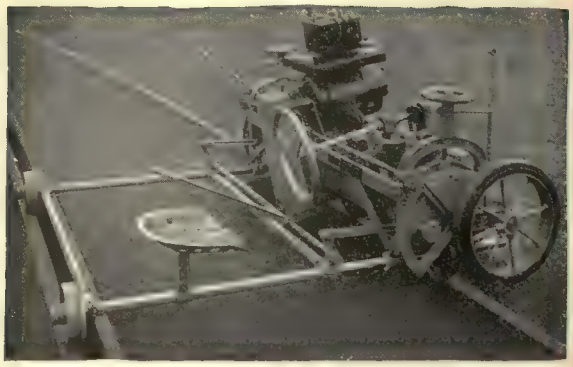
Also, it is this superior performance that has established the preference for BP helical gears on passenger equipment.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

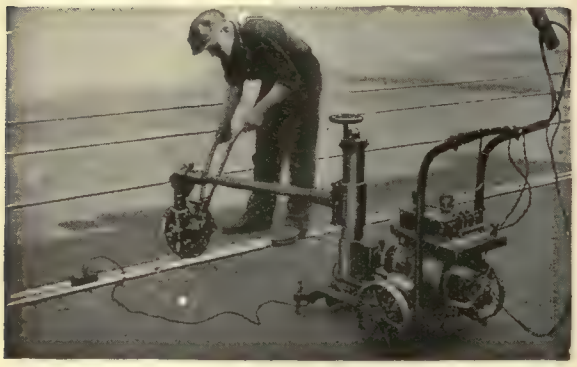
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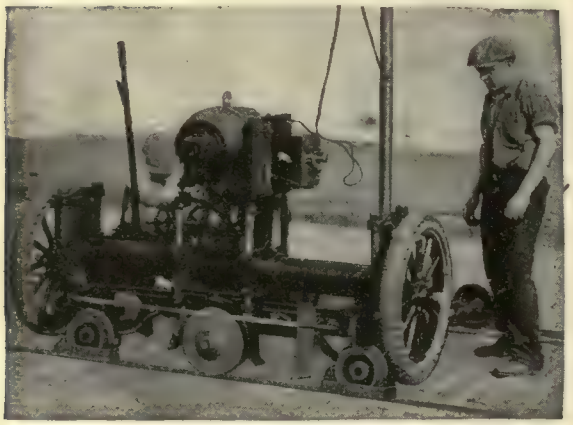
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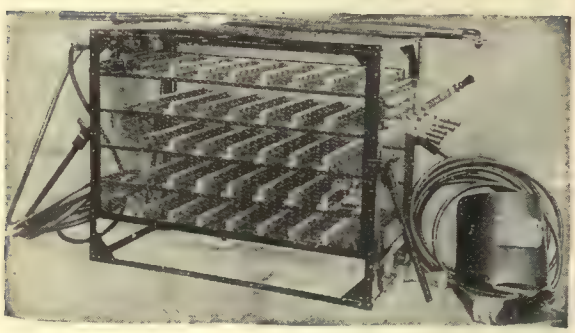
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

Popular pastime:

Gum-shoeing for nerve-rackers

Let the editor say it again. We quote from last month's Journal:

One thought missing is reference to track-grinding. That's the thought that makes all the difference in the world. Grind and weld, weld and grind—that's the answer to the cry for peace and applause.

"Noise is receiving ever-increasing attention as an unfavorable factor in American life, particularly in metropolitan centers. Means of eliminating or reducing it are under consideration nearly everywhere."

* * *

"With all this campaign against unnecessary noise it is inevitable that unfavorable attention should be directed to noisy street cars."

* * *

"The committee on noise reduction of the A.E.R.E.A. has shown conclusively that most of the noise usually associated with car operation is unnecessary."

* * *

"As to the track, of itself it is one of the quietest things on earth. But when a car passes it begins to act up and emit many and various noises. Here again the wrench and the welder can make a lot of difference. By tightening loose joints, truing up worn surfaces and securing correct alignment even poor track can be so improved that cars can run on it without emitting sounds of pain that arouse the neighborhood."

* * *

"Money spent on noise reduction will return directly in lower maintenance costs. Equally important, however, is the effect on the public. This cannot be measured in dollars and cents but it is hardly an exaggeration to say that it may mean the difference between success and failure."

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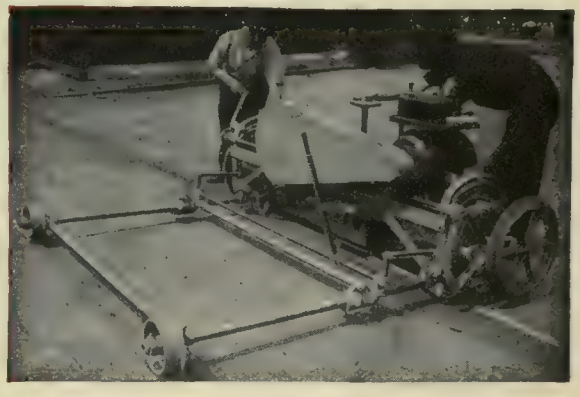
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In communities throughout the country, alert overhead superintendents have tested, then standardized on the O-B Renewable Underrun Section Insulator. Their experience can be duplicated on any property. Inquire of your O-B representative.

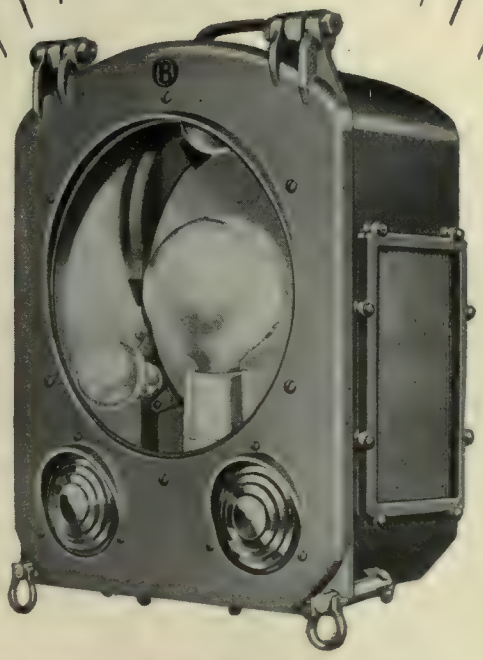
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TO meet a demand brought about by the O-B Dash-Illuminating Headlight for city service, O-B now offers a new and distinctly different headlight—a *dash-illuminating* headlight for *interurban* service—a headlight designed to com pletely overcome the major disadvantages of older designs. This new O-B Inter-urban Type Dash-Illuminating Headlight provides:

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4. 100% *safe* illumination at all times.

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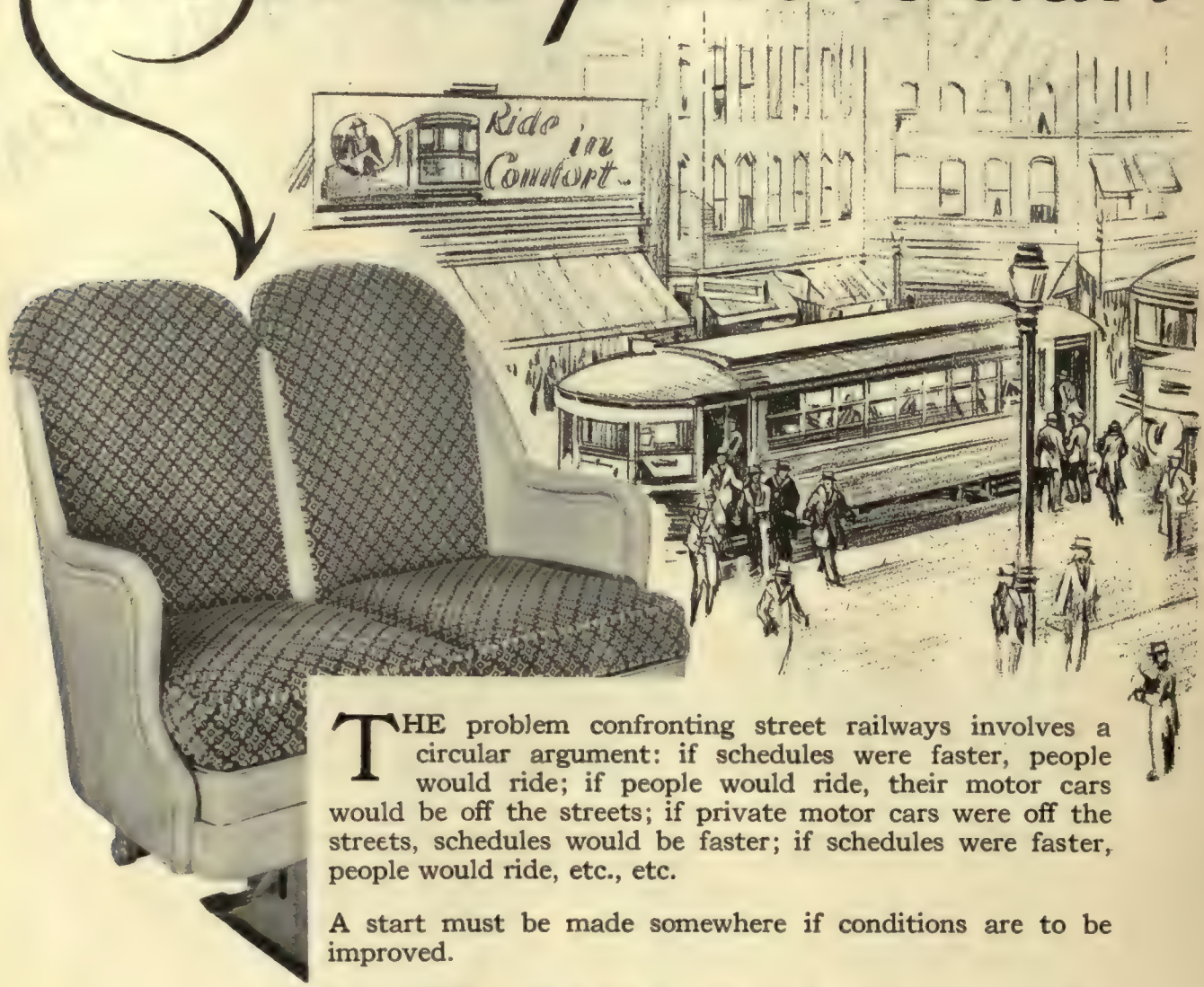
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This is the place to start



THE problem confronting street railways involves a circular argument: if schedules were faster, people would ride; if people would ride, their motor cars would be off the streets; if private motor cars were off the streets, schedules would be faster; if schedules were faster, people would ride, etc., etc.

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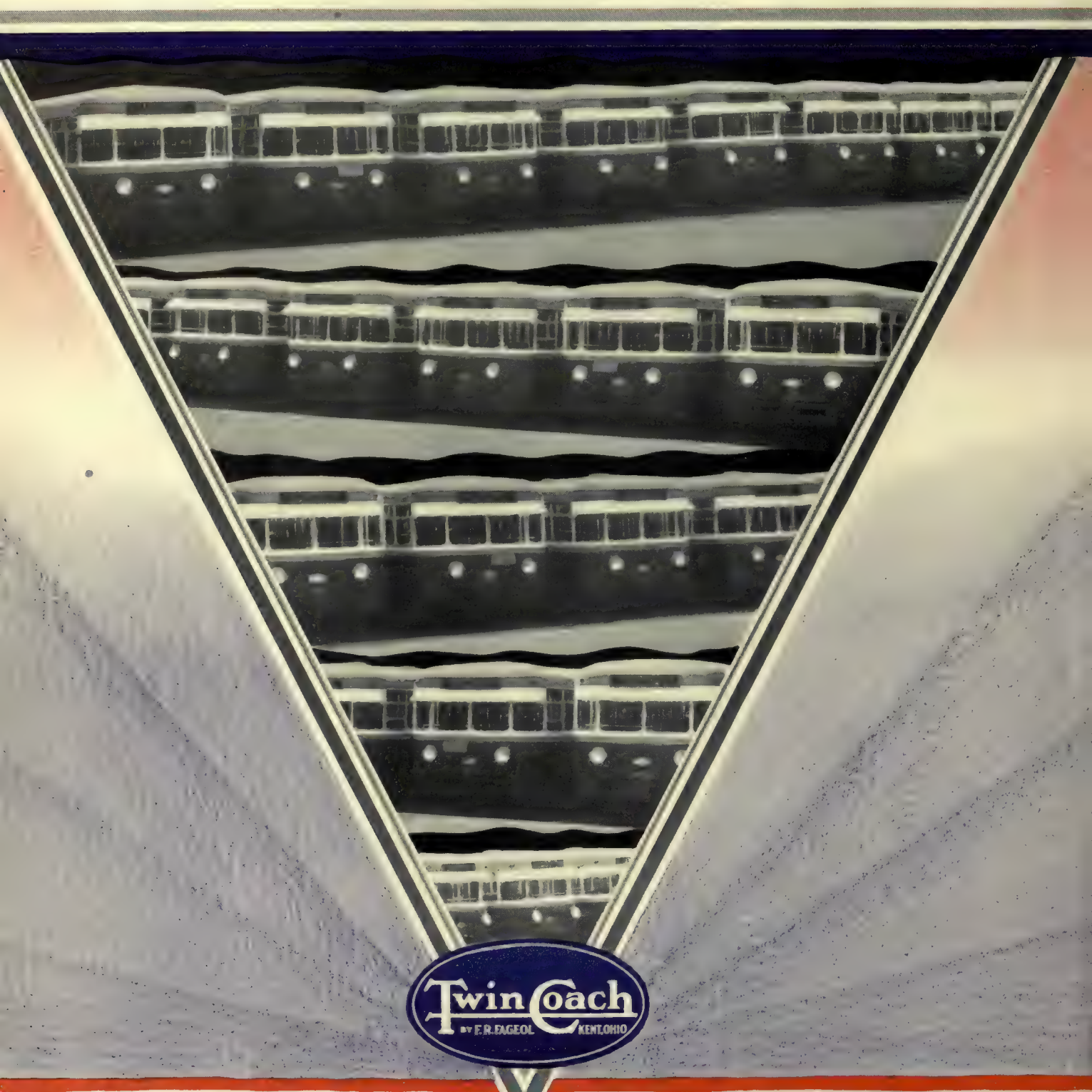
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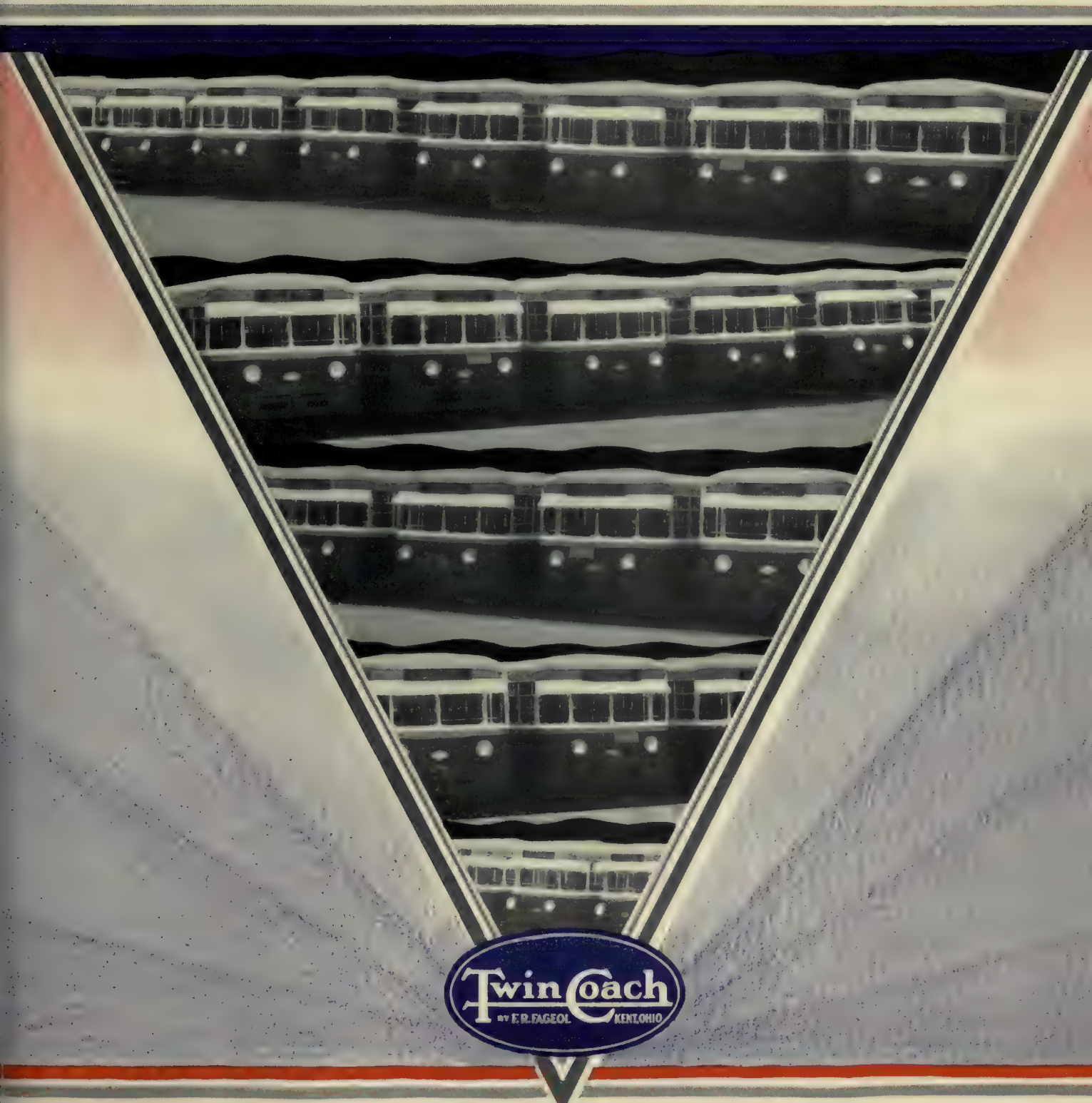
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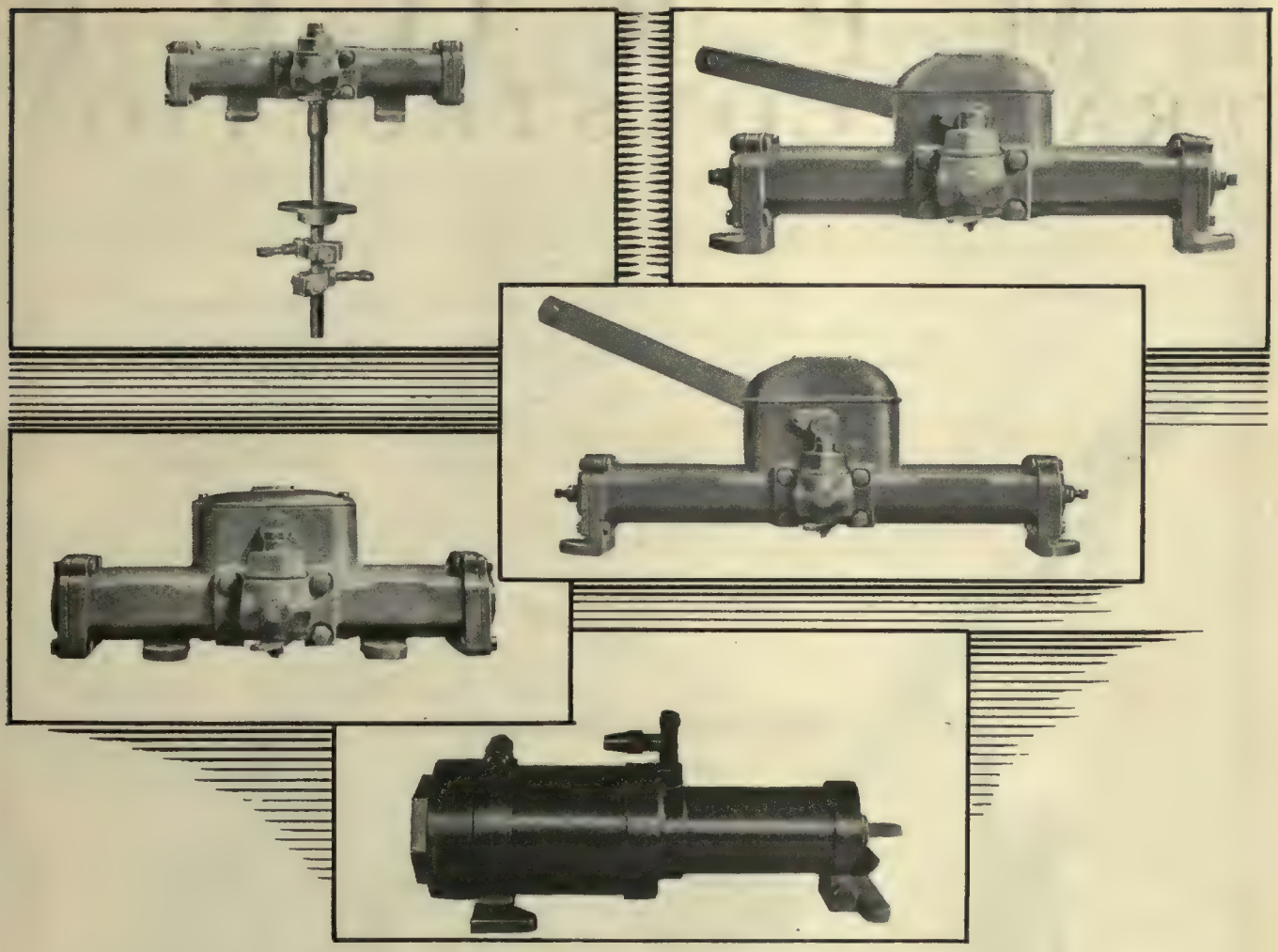




"Electric Coaches are no dream They are real live Transportation"

W. S. Rainville, Jr.—Equipment Engineer—at Birmingham meeting Southern Equipment Association. January 27, 1930

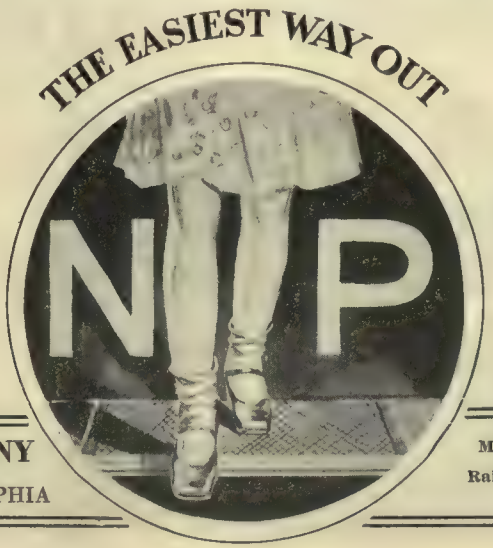
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BY E. R. FAGEOL KENT, OHIO



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For one man cars, the N. P. Automatic Treadle Exit Door Provides



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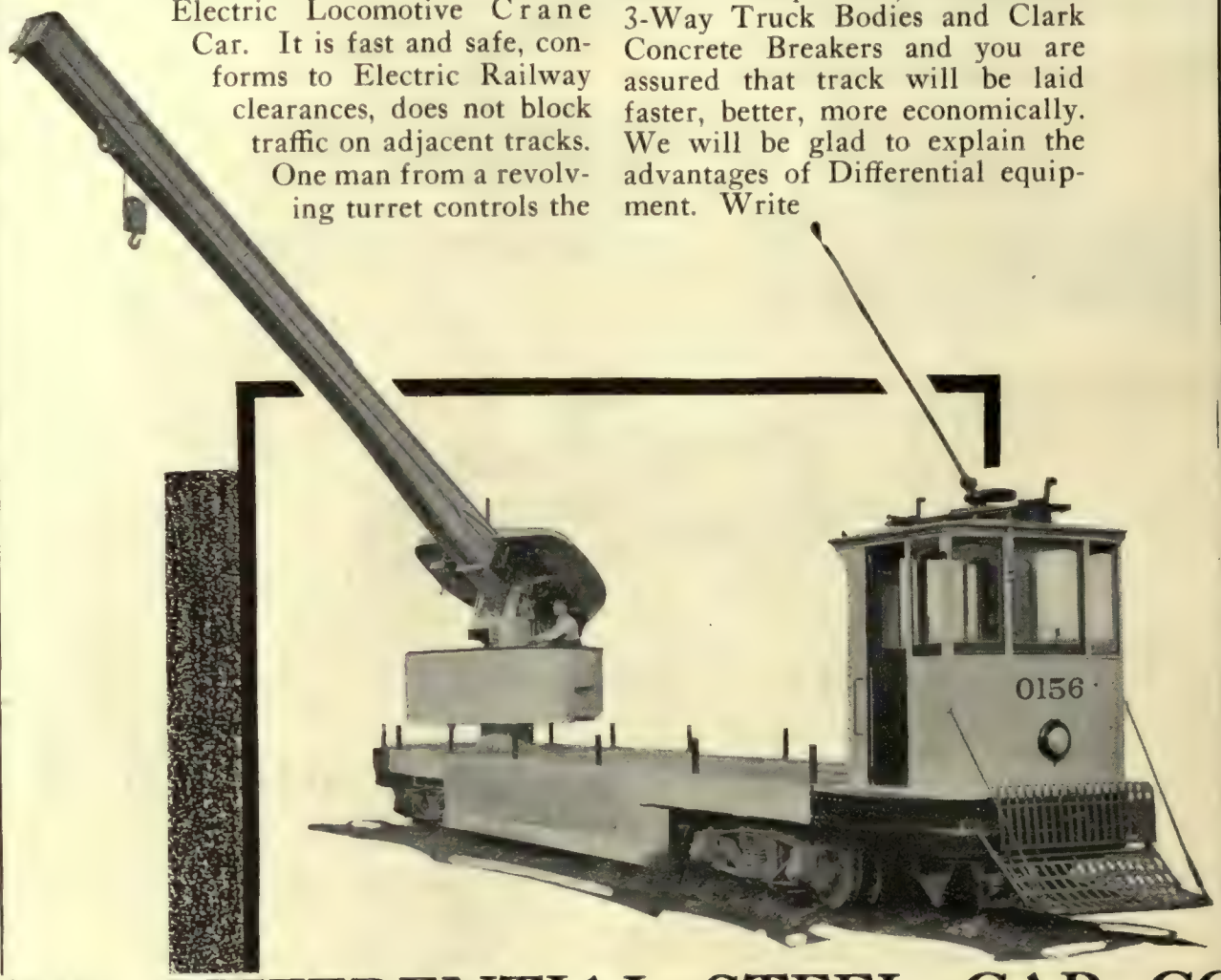
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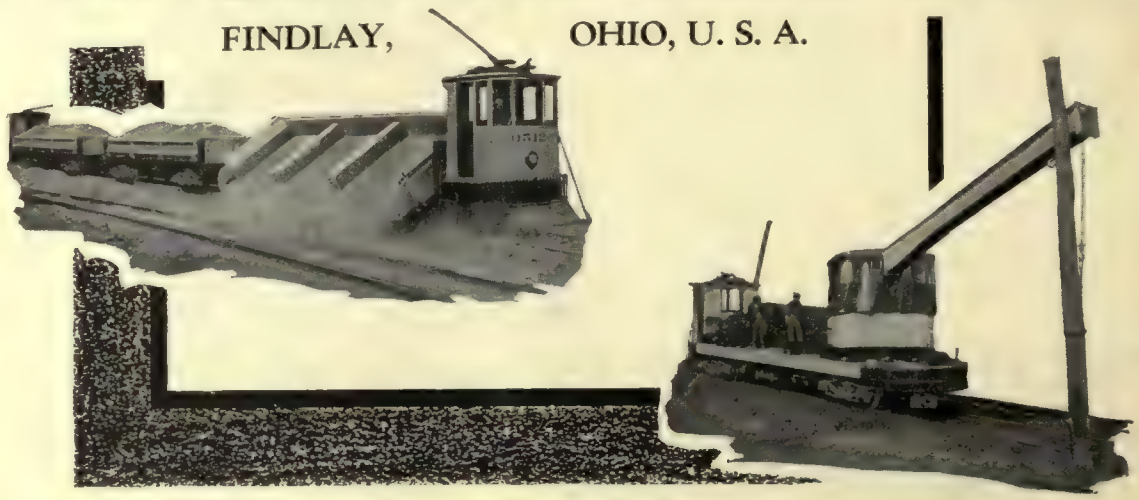
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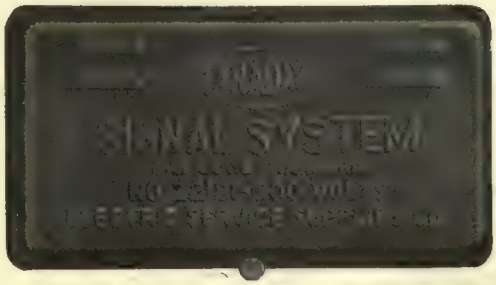


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2 AIDS TO FASTER AND



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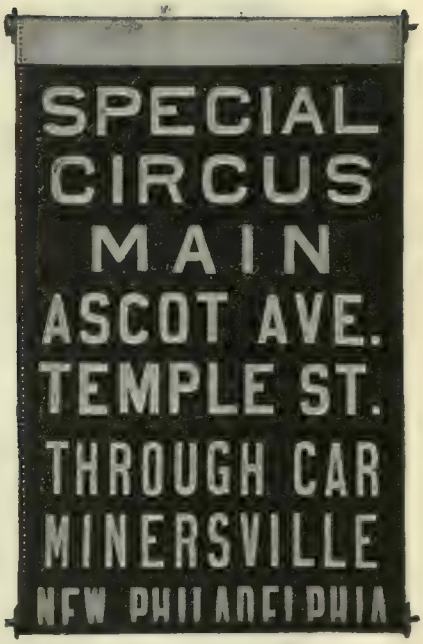
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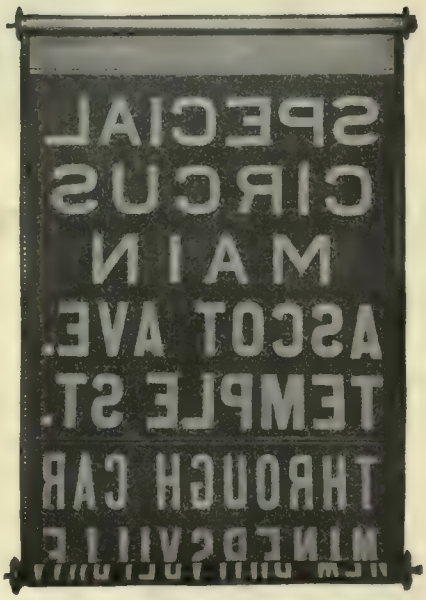
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General Electric has developed accessories that are right:

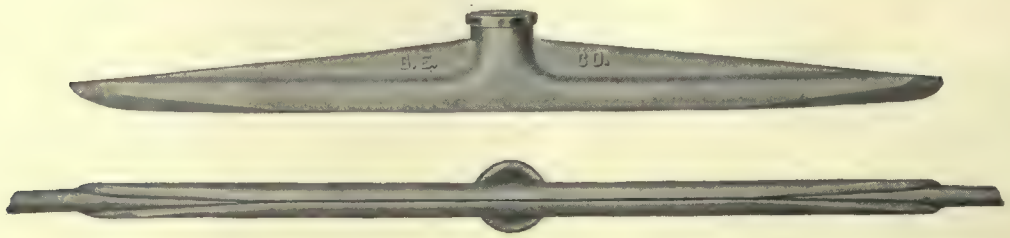
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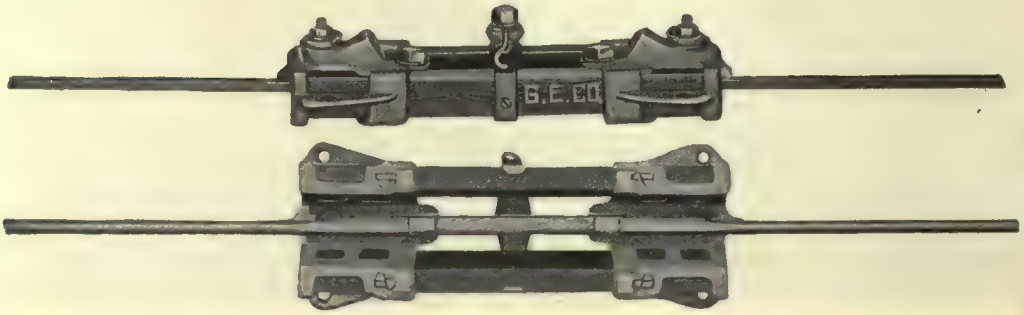
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TO consider purchase price alone, without regard to earning power or possible economies of operation, is to be "penny wise and pound foolish".

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Let the General Electric transportation engineers analyze your service and make recommendations for the best type of equipment.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 74 New York, March, 1930 *Number 3*

Public Transportation Gaining Steadily in Large Cities

MORE than 6,500,000,000 electric railway and bus passengers were carried last year by the public transportation systems in a group of ten of the largest cities in the United States, according to preliminary reports of operating companies. This figure sets a new high record for traffic in these cities. While 1929 was not a record breaking year in every city in the group, the slight recessions in some places were more than offset by substantial gains in others. The total is an increase of nearly 33 per cent over the total for the same cities ten years ago, when approximately 5,000,000,000 passengers were carried. Considering only the passengers carried on the electric rail lines the increase was a little over 25 per cent.

Cities included in this group are New York, Chicago, Detroit, Cleveland, Baltimore, Boston, Pittsburgh, St. Louis, Milwaukee and San Francisco. Taken together their transportation systems handle a substantial part of the total city transit traffic of the country. During the past decade the population of these cities, together with a few adjoining communities served by the same transportation systems, has increased about 16 per cent. Thus the growth in riding has been more than twice as rapid as the growth in population. Expressed in another way, the number of rides per inhabitant per annum has increased from an average of 330 ten years ago to about 375 at the present time. A similar trend toward increased use of public transportation facilities is evident also in other cities, but complete figures are not available at this time.

Extension of rapid transit service in New York, Chicago and Boston has played an important part in the growth of the traffic in this group of cities. It is significant, however, that substantial traffic increases have been recorded also in those cities of the group which have no rapid transit facilities.

The relative importance of bus service has been increasing steadily. Ten years ago buses carried less than 1 per cent of the total number of passengers while the electric rail lines carried over 99 per cent. Today the buses are carrying nearly 6 per cent and the rail lines 94 per cent of the total. By far the largest part of this increase in bus traffic has resulted from the development of new services, as there has been comparatively little replacement of rail service in these cities. Express and de luxe bus service, as well as local service reaching new territory, has brought additional business to the transportation systems while the electric rail lines have continued to render highly efficient service on heavily traveled routes.

That the total number of riders in public transportation vehicles has increased during the past decade in this group of growing cities is not surprising. That the average number of rides per inhabitant per annum should have shown a substantial increase, however, is worthy of note. And that this should have occurred simultaneously with the phenomenal development in the use of the private automobile is, indeed, remarkable. Better than could any words these few figures show the essential character of public transportation service.

Defining the Place of the Taxicab

SELDOM has it been possible to obtain any exact measurement of the extent to which the cruising taxi contributes to traffic congestion. For that reason the experience of the city of Pittsburgh, where a taxicab strike has been in progress for some weeks past, is particularly interesting. Notable improvement in traffic conditions has been evident since the taxicabs have been off the streets. Congestion has practically disappeared although there has been no decrease in the total number of persons entering the downtown area. This is easy to understand as counts made previous to the strike showed that more than 75 per cent of the taxicabs moving through the downtown streets were empty.

Relief of congestion has been of great benefit to both the users of private automobiles and the users of street cars and buses. The speed of all vehicles has been substantially increased and the maintenance of schedules has been greatly facilitated. The additional revenue accruing to the railway has not been a matter of any importance since the average number of persons who formerly used taxicabs did not amount to much more than 1 per cent of the railway and bus riding. But the improvement in service made possible by the elimination of the cruising cabs has been remarkable.

From this it would be easy to contend that taxicabs should be permanently banned from congested districts, but such is not the conclusion of transportation men who have been studying the situation. Rather it is thought that the strike has proved the need for regulation which will permit the taxicab to play its proper part in transportation without adding unnecessarily to congestion.

Of late there has developed a widespread tendency on the part of taxi operators to depart from the field of individual service which they are particularly well adapted to render and to encroach upon the field of mass transportation. Taxicabs cruising along lanes of heavy travel with the hope of picking up chance passengers are doing little more than duplicating existing service of street cars and buses. Not only does this add unnecessarily to the total volume of traffic on the street but it constitutes an uneconomic use of the roadway, because the number of passengers carried is

disproportionately small compared with the number of vehicles. Probably the taxicab operators have drifted into this practice almost unconsciously. The legitimate demand for taxicabs fluctuates widely. Sufficient equipment is provided to meet the maximum demand. Fares have been cut down to a minimum in most cities. Hence it has become necessary to drum up business in slack hours and the cruising cab with all its attendant evils has come into being.

To correct this situation it is necessary only to restore the taxicab to its legitimate field by eliminating cruising, establishing stands off the main streets and placing call boxes at convenient locations. Taxi service can thus be made entirely satisfactory for those who desire individual transportation, without clogging the streets with empty vehicles going nowhere.

Agencies interested in traffic regulation throughout the country have been studying the situation in Pittsburgh. Developments there are proving the soundness of many theories previously held and it is not too much to hope that the result of this experience will be a clearer understanding of the place of the taxicab and a larger degree of regulation to control its operations to the best advantage of the public at large.

Public Protection or Private Profit?

RECENT developments in connection with legislation concerning the practice of engineering in the state of New York deserve the close attention of electric railway men. On the one hand the architects' law has been changed to make it a misdemeanor for any person other than a registered architect to "design plans and specifications for structures or alterations exceeding $10,000 in cost." On the other hand, a proposal has been made to amend the engineer license law in a way which might make it necessary for track foremen and substation operators to hold engineers' licenses. The potential danger in these regulations is too serious to be ignored.

When these laws were first enacted some years ago, the avowed purpose was to make sure that the designers and builders of important structures should be competent to perform their work. Consistent efforts have been made, however, to convert the laws intended for the protection of the public into instruments for improving the financial condition of architects and engineers by restricting the performance of certain jobs to a limited number of officially authorized persons. Many engineers, however, being wholly out of sympathy with these efforts, have refrained from applying for licenses. Thus it has become a common practice of corporations doing engineering work to have one license holder sign all such plans and designs as require the signature of a licensed engineer. To a considerable extent this practice has defeated the original purpose of the law.

It is now proposed to correct the situation by defining an engineer as one "who engages in, or who holds himself out as able to engage in—the designing, the preparing and filing plans and specifications for, the supervising and inspecting of—structures, machines, processes and (or) other engineering work or appliances involved in public or private projects, the safety and control of which are essential to the public welfare." Just how far-reaching this amendment would be in actual practice is difficult to foretell. Nevertheless it is evident that it might easily be interpreted to include a large number of persons whose work is in no sense real engineering. Sufficient opposition to the new definition has developed, however, so that its adoption at this time appears improbable. Efforts to amend the law so as to place engineers on an equal footing with architects as regards structural design appear more likely to succeed.

Whatever the feeling of individual engineers may be concerning these license laws, their existence is a condition and not a theory. They are in effect in some 26 states, in several of which trends have been evident similar to those in New York. Undoubtedly there is need for correcting certain conditions now existing. But care must be exercised to see that the cure is not worse than the disease. It would be easy to go too fast and too far with changes in the present law. Rather than remain aloof because of their disapproval of these developments. all engineers should participate and help steer them so that the rights of engineers shall be adequately protected without extending the scope of the law to cover too broad a field.

Co-ordinated Transit Makes Progress

WHEN a community passes from the small city stage to that of metropolitan center a demand comes for transit of a different kind from that which was satisfactory before. People do not all want to reach one central point, and a radial system breaks down. This is particularly true because of increasing street traffic congestion. Even higher schedule speeds, while essential, will not alone compensate for wrong methods or indirect routes. Accordingly, some form of co-ordination in which all the available means of transit are used to best advantage is necessary to the continued growth of the community.

The latest city to follow this course is Rome, Italy. Beginning with the first of this year a radical change was made. Outlying routes of street cars were consolidated and now feed into a belt line surrounding the central part of the old city. On account of crooked, narrow streets, all cars have been excluded from this area and buses are used to furnish such distributing service as may be necessary. Crosstown passengers transfer to the belt line and do not enter the congested district at all. This system replaces the one that was in use for many years. A multiplicity of street car routes, most of them with infrequent headways, reached many destinations, and nearly all of them ran through the most congested portions of the city. Buses supplemented the service, principally in the outskirts.

To complete the new system a subway has been planned. When completed—it will take several years to build—it will give direct routing to central points, with schedule speeds that cannot be approached by surface transportation. It is to be presumed that a further rerouting of surface lines will be possible when the subway is built.

In some respects the new system in Rome resembles that built up in the Boston area in this country. Rapid transit plays a large part in the success of the Boston system. Surface routes, for the most part, are local in character and terminate at the nearest rapid transit stations, where transfer is made to one of several trunk lines passing through the center of the city underground. Such surface cars as do enter the heart of the city do so in subways and terminate at locations convenient to the most important points.

London also has a system which is not unlike these two. In one respect it more closely resembles the new

Rome system—surface cars are excluded from the central area and buses furnish all the service. Here again there is the problem of crooked, narrow streets. There is a comprehensive network of subways such that the passenger from the outlying districts does not need to use the surface routes at all. The buses should be of chief advantage to the short rider who does not leave the central area. However, most of the routes radiate out for several miles. As a consequence there are many buses on the streets and the congestion has become so great that movement is very difficult. The function of the buses for local riding is all but defeated. In this respect the Rome plan is superior, although it involves a transfer for anyone who travels between the suburbs and the center of the city.

Such a plan as the one just started in Rome is bound to be watched with interest. It is too early to pass judgment on it until more definite results can be had than are available after a trial of a few weeks. In fact, it is not possible to determine the full value of the plan until it is rounded out with the completion of the subway system, and operation of that cannot begin for several years at the very least.

A Study in Financial Fortitude

ANOTHER electric railway has been reorganized on a basis that gives every reason to believe it will meet successfully the new economic conditions. The road is the Chicago, South Bend & Northern Indiana Railway and its affiliate, the Southern Michigan Railway. The history of what has been done with it financially is reminiscent of the suggestions contained in the report of the American Electric Railway Association's committee on finance made some few years ago. Whether or not those responsible for the reorganization had in mind the recommendation of the committee on finance of the association is not disclosed, but the process of procedure followed the committee's recommendation and the successor company has emerged with a financial structure which does resemble the typical one suggested.

Significant, indeed, is the fact that the reorganization was not voluntary. Only occasionally can security holders be made to see the value of voluntary action under the theoretically sound doctrine of the greatest good to the greatest number. This was not one of those rare occasions. So the stage was set for the auctioneer and his hammer.

But that is said and done. To recapitulate the financial set-up here is not necessary. It is important, however, to note that the Indiana Railway first mortgage of $426,000 emerges as an extended obligation to be amortized out of current earnings within six years. When that has been done the funded debt will be $1,533,085. Meanwhile treasury bonds will be issued to finance additions and extensions and the equipment trust method will be called into use to finance the purchase of ten new city cars and ten new interurban coaches. Again obligatory amortization out of earnings will tend to keep the structure of bonds within the reasonable earning capacity of the property. Accrued interest on other bond issues has been cared for by additional evidences of indebtedness.

All in all, the new structure has been so arranged as to make it possible to continue operation on a basis that will attract capital and credit and permit the properties to be properly rehabilitated. The successor organization is regimented financially for a gait fit for the economic company in which it finds itself, not for the step of the wooden soldier. The facts are a study in financial fortitude.

Municipal Operation Not Immune from Economic Law

CASH fares on the Detroit municipal railway will go from 6 cents to 8 cents on March 15 and cash bus fares from 10 cents to 8 cents. The ticket rate on cars has been nine for 50 cents, but will become four for 30 cents or ten for 75 cents for use on either cars or buses. These changes follow the determined stand of Mayor Bowles to the effect that the railway shall meet, in fact as well as spirit, the mandate of the charter that it charge a rate of fare adequate to pay its debt obligations and at the same time provide current maintenance money sufficient to keep the system healthy.

Apparently the Mayor had little cause for dissatisfaction with the system as it was being run. But he was not satisfied that the fares were sufficient to provide out of earnings for the orderly development of the system to meet the expanding requirements of the city. So he asked John H. Morgan, auditor to the system, to report to him. The principal source of trouble, Mr. Morgan said, was that the rate of fare had never been sufficiently high to produce revenue to pay all necessary obligations as provided by the city charter.

If the Mayor was not prepared to recommend one way or another about fares when he took office, Mr. Morgan's statement removed the last iota of doubt from his mind. The street railway commission then backed him up. It voted two to one for the increase. Frank Couzens, son of Senator Couzens, under whom municipal ownership was brought about when the latter was Mayor of Detroit, was the recalcitrant. He is understood to have taken the position that the alleged neglect in the past to provide funds sufficient for depreciation was no reason why fares should be advanced now. But they are to be advanced. They are to be advanced because the municipal railway is no more immune from the play of the economic forces around it than are the private companies operating under comparable circumstances. This, the most recent operating statistics prove.

For twelve months ended Jan. 31, 1930, the net profit on the municipal lines was $106,576 after charges, taxes and sinking fund requirements, compared with a net profit of $399,873 in the preceding twelve months. That is not much to brag about under the circumstances. As for the future, if there is no decrease in traffic and several other if's prove to be correctly diagnosed, gross revenue should increase by $3,000,000 for the current year over that for the one recently closed. Other phases of the matter are reviewed elsewhere in this issue.

Meanwhile, $8,760,322 will be needed by June 31, 1931, for new equipment, extensions and repairs. The 1930-1931 budget sets up a bond issue of $7,000,000 to take care of the major part of this cost. If General Manager Smith has his way, 100 new cars and 75 buses will be purchased at once at a cost of $2,225,000. He also feels that a similar number should be purchased during the 1930-1931 fiscal year. Detroit really needs them. Of that there is no doubt. To buy them the railway will have to pay real money, and the Mayor intends that the city shall get that money from the people who use the service.

Traffic Officers as

Transportation Men

By

CLARENCE P. TAYLOR

Assistant Traffic Engineer Department of Public Works
Commonwealth of Massachusetts

Promoting safe, orderly and expeditious use of the streets is the primary function of police traffic officers. They should approach the problem from the standpoint of transportation rather than that of law enforcement



The police officer, as a controller of traffic, is becoming an expert in the management of people and vehicles

ENFORCEMENT duties of traffic officers should be incidental to their primary functions of promoting safe, orderly and expeditious use of the streets and highways. A traffic officer should be more of a transportation man than an enforcement officer. The failure of some officers to grasp this point of view cannot be properly charged against them as individuals. The fault lies deeper. The rapid growth in the size and complexity of travel created baffling problems of automobile fatalities and traffic congestion. No precedents were available for meeting the difficulty, nor did time permit customs to evolve or best practices to develop. As a result it was only natural to try legislation as the first "cure." Certain acts and omissions were made crimes and the whole problem thereafter turned over to the police to struggle with as best they could.

Previously policemen dealt chiefly with vicious criminals, or at least with definitely anti-social persons, and seldom had to bother with forgetful and careless citizens. The situation now is that, according to law, both traffic law violators and burglars are criminals. Hence, is it any wonder that men who have spent a large portion of their lives handling hardened criminals should have difficulty in adapting themselves to the handling of a totally different class of law-breakers?

The traffic problem might have been given to railroad men to solve. Indeed, such an assignment would have been quite logical. Perhaps, if this had been done, the railroads with their superior experience in the transportation field and their special facilities might have been more successful than the police. Police departments had no men who were trained and able to do the necessary research and engineering work. They had no staff of men experienced in the training of the public mind. They had no funds with which to promote the needful enterprises. All that the police had was a large fund of knowledge and experience in the handling of criminals. Considering the handicaps, it is a wonder that any progress has been made.

Not only has the problem of the regulation of traffic

been a source of much trouble to the police, but in size it now bids fair to eclipse that of crime. Many chiefs of police find that more than half of their own time is spent working on traffic problems and that if the public were to have its own way all of the policemen would be on traffic duty most of the time.

The police were among the first to recognize the special nature of street traffic control. As a result, all of the foremost police departments have traffic bureaus or divisions to which all traffic functions are attached. This specialization has been furthered by the advent of the local traffic engineer, who takes charge of the engineering features of street traffic, and the local safety council, which disseminates safety education. When these two agencies are active it is possible for a traffic division to concentrate on enforcement.

Enforcement, however, has come to have a broader meaning than the apprehension and prosecution of law violators. In traffic, it no longer stands for wholesale arrests, but for the performance of those duties which will best promote safe, orderly and expeditious use of the existing street surfaces. Such a conception of a traffic officer's purpose may be less definite than one which prescribes the arrest and prosecution of all offenders, but it is certainly more apt to produce the results which legislators sought when they passed traffic laws.

Quarrelsome Disciplinarians Disappearing

Traffic officers still vary considerably in their notions of how they should conduct themselves and what they should expect from the public. A change for the better is observable as the blundering, officious type is being displaced by men who are both efficient and pleasant. The latter are experts in the management of people and vehicles and not quarrelsome disciplinarians.

When viewing the traffic officer as a transportation man one finds some striking similarities between the duties which he performs and those of railroad men. A railroad switchman, in an interlocking tower where two lines cross at grade, signals approaching trains so as to prevent conflicts and collisions. A traffic officer directing traffic at an intersection does the same thing for vehicles. A train dispatcher decrees that certain trains shall wait for others and gives the most important trains the preference. Also, he sees that there is ample time in the schedule for the necessary movements to be made in safety; so, too, with a traffic officer when he sets the timing of traffic signals. To the main flow of traffic he gives the most time and the advantage of progressive movement in trains if possible. He also allows a short interval after stopping the traffic on one street to permit the last few vehicles to clear before a signal to proceed is given the traffic waiting to cross.

A railroad general superintendent has many executive functions that are not analogous to the duties of a traffic officer, but his principal objective of keeping things moving is the same. While such a superintendent is directing his attention to congested lines and idle rolling stock, traffic officers are looking after congested streets and automobiles that are parked overtime.

When a parade or caravan is to pass through a city the traffic officer often plays an important part in assembling and running it. In the work of making up the procession does he not do something very similar to what a yardmaster and switching crew do when they make up a train? As soon as the procession is under way he is generally charged with seeing that the correct routes are taken, that the schedule is kept, and that all necessary precautions are taken for the safe and uninterrupted movement of the column. In this rôle his responsibilities are obviously like those of a conductor.

In both fields a certain amount of police work is required. But as the work of the railroad police is small compared with that of the whole organization, so, too, should the arrests and prosecutions by traffic officers constitute a small part of their total efforts.

Both the railroad safety engineer and the traffic officer are employed to prevent accidents without unduly interfering with transportation. The work of each involves the investigation of traffic hazards and the taking of appropriate action toward the elimination of dangerous conditions. In fact, a traffic officer should be guided by the same principles and practices as are followed by safety engineers.

These few examples of similarity between some of the work done by railroad men and that performed by traffic officers may help to make it clear why it is desirable that a traffic officer should be more of a transportation man than an enforcement officer. In the capacity of a transportation man a traffic officer would serve the public by keeping things moving and by working diligently and intelligently to prevent accidents. On this basis the value of an officer would not be measured by how large a number of arrests he made or how large the gross receipts from fines were but by how few people he arrested, coupled with how smoothly and efficiently he kept traffic moving, how few accidents occurred and how few complaints were made about traffic conditions or the officer.

Training Efficient Traffic Officers a Problem of Personnel Management

To train a group of traffic officers to work efficiently is a difficult problem, and one in which the details vary with each individual department. However, assuming that a particular traffic division is well organized, political interference small, and new men selected carefully for their fitness, the problem resolves itself chiefly into one of management of personnel. The practice of sending men out to handle traffic without a single instruction, other than where they are to go, is proving too costly to continue. Uniformed officers make numerous mistakes and sometimes irreparable blunders. The time required for their superior officers and the courts to straighten out case after case of avoidable error is sufficient ground for some educational effort. And when to this is added the wasted time of the officer himself as well as that of clerks, attorneys, witnesses, juries and defendants, the need is apparent. Moreover, a difference in the accident and congestion situation may properly be a debit against an incompetent officer.

One of the basic principles of good management is that the worker should be instructed thoroughly in what he is to do. For this purpose, Baltimore, Boston, Detroit, Los Angeles, New York and many other cities have training schools for traffic officers. Several states, some counties, and a few universities, too, have joined in the movement by offering special opportunities to ambitious officers. The rapid growth of associations of traffic officers is indicative of a general desire on the part of traffic men themselves to learn from the experiences of each other. It is also true that each year sees a greater number of traffic officers visiting in different parts of the country in order to see first-hand how things are done in other cities. It is important that electric railway men know of these movements in order that they may

encourage them in their own localities, for these are some of the best means for training traffic officers.

A well-rounded course of instruction should include a working knowledge of police practice, criminal investigation, law and psychology. Special effort should be made to teach the practical details connected with the characteristics of traffic flow, the handling of traffic at intersections, enforcement of parking regulations and other important traffic rules, handling of violators, handling of crowds and processions, the proper procedure at fires and major disasters, the testing of brakes and headlights, the prevention of accidents, the investigation of traffic hazards, the investigation of accidents, the proper procedure and conduct in court and the way to get along congenially with fellow officers, other departments, the press and the general public.

No modern business enterprise would attempt to direct its employees without some form of supervision; yet there are still many traffic divisions in which there is little, if any, check for determining the extent to which orders are obeyed and policies carried out. Every squad of traffic officers needs a field supervisor to show them how their work should be done, to see that it is done according to instructions, and to see that there is sufficient work planned ahead to keep them busy. In the office, it is vitally necessary to keep track of each officer's assignments, to see that they are attended to.

But officers cannot do their best work unless they are in a favorable frame of mind. The cultivation of good morale is perhaps the most difficult task that any chief faces. Success can come only when a chief is able to demonstrate leadership and unflinching fairness. In addition, there should be allotted to each man sufficient work to keep his mind constantly occupied. Ambitious men want to get ahead, and unless consideration is given to them they may leave the department or spread dissatisfaction. Increase of pay, special details on difficult cases or problems, promotions and recommendations to executive positions in other traffic departments are means of keeping this class of men happy in their work. Politics, always a disturbing element, should not be permitted to interfere in the appointments or the work of a traffic division. Every reasonable means should be taken to make the work interesting to the men.

Modern business methods of managing personnel must be adopted to make traffic officers efficient transportation specialists. Such methods will be selected not just because they are used in the best-managed businesses, but because they are right and will yield great benefits to the traffic officer, his department and the public.

New Track Construction Methods Prove Speedy and Economical

By R. H. Dalgleish
Chief Engineer Capital Traction Company, Washington, D. C.

BY THE adoption of a new track design in which bent steel ties are imbedded in monolithic pre-mixed concrete, delivered by truck and thoroughly tamped and vibrated by special power-driven apparatus, the Capital Traction Company, Washington, D. C., has found it possible to lay track faster and more economically than in the past. In May, 1929, the company rebuilt 3,104 ft. of surface track by the new method. This track has now been in operation about eight months, during which time the temperature has ranged from zero to 100 deg. F. A few lateral cracks have developed, but there is no indication of any separation between the rails and concrete. The results obtained are considered so satisfactory that it has been decided to standardize on this method of construction until some better one is developed.

The design consisted of 103-lb., A.E.R.E.A. 7-in. grooved girder rail installed on a new type International twin steel tie, thermit welded joints, and monolithic concrete pavement from below the ties to grade. The original track had been constructed on a 9-in. crushed stone bed, which was not materially disturbed in the reconstruction work. The new type steel tie, which is bent upward in the center, reduces the amount of excavation necessary as compared with that of the straight tie by about 5 cu.yd. per 100 ft. of track, with of course a corresponding decrease in the amount of concrete. At the same time it provides for an ample depth of concrete in the center of the track to take care of vehicular traffic.

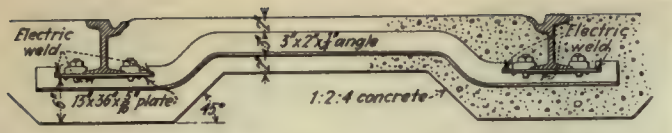
Ties and rails were installed in the usual way, but as the concrete was placed the entire track structure was vibrated by means of a machine with two pneumatic hammers, mounted on a piece of channel iron in such a position that each hammer operated over a block of steel placed approximately over the lip of the rail. A thorough machine tamping of the concrete was followed



This type of track structure installed by the Capital Traction Company on Connecticut Avenue has now been adopted as standard

immediately by the vibration treatment. The result was extremely interesting. Air bubbles could be seen along the rails for a distance of 5 ft. ahead of the machine, clearly proving that what had been previously considered well-tamped concrete, in reality contained many voids. The vibrating machine was moved along the rails about a foot at a time. In addition to a very dense concrete with a perfect bond around rails and ties, the treatment also brought the mortar to the surface so that a good finish was obtained easily.

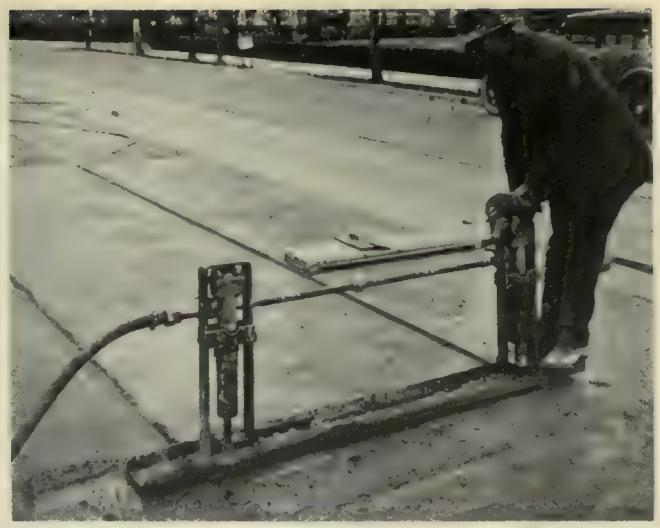
It might be thought that the cost of excavation neces-



Use of bent steel ties imbedded in monolithic concrete has proved economical and satisfactory

sary to install the bent ties would more than offset the saving in concrete, but this did not prove to be the case. After the renewal of the old track, practically all that was necessary was the trenching under the rails, and by means of a template made of 2-in. lumber the trenches were easily kept to the proper size and grade.

The concrete for this job was furnished by a contractor in mixer trucks, the materials subject to inspection by the railway at his plant and on the job. The use of truck-mixed concrete also serves to keep the street clear of mixers, aggregate piles, water lines, etc., resulting in lower overhead costs and fewer accidents. Mixing of the concrete was done on the job under the supervision of the concrete foreman, who carefully regulated the amount of water used. It is interesting to note that the actual amount of concrete necessary to complete the job was found to be about 7 per cent more than the estimated amount, as based upon past experience in the use of straight ties. This excess probably was due to the settlement and compacting of the concrete by the vibration treatment.



Vibration treatment compacted the concrete to an extent that required the use of 7 per cent more material than had been estimated

The total cost of this new type of construction was $8.976 per foot of single track. Labor (6.258 hours) cost $2.712, hauling cost $0.219, and material cost $6.045 per foot of single track. These figures include the cost of installing and removing temporary crossovers, hire for switchmen and signalmen, etc.

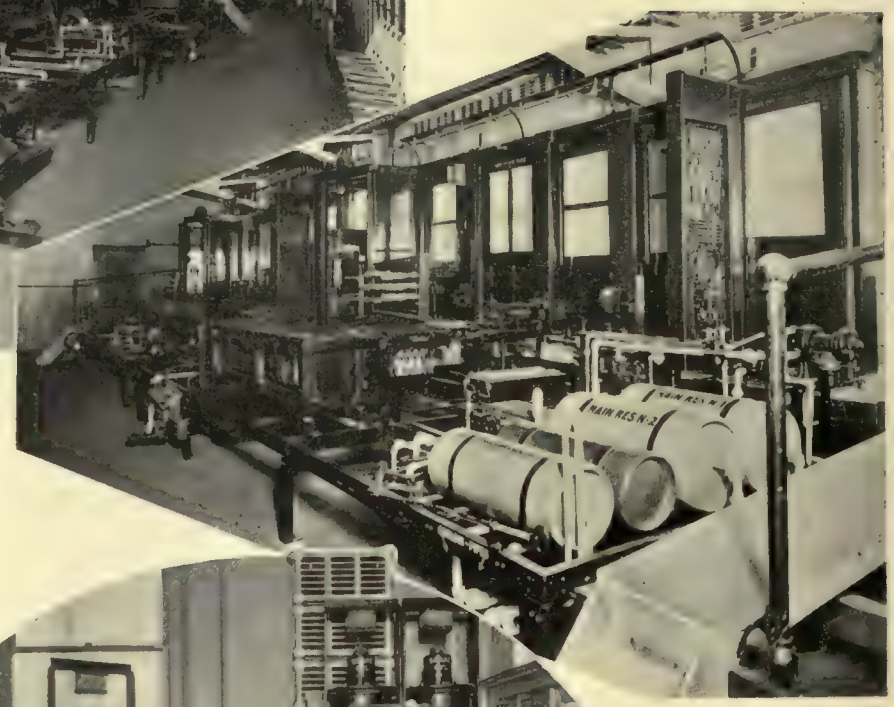
Baltimore Substation Wins Architectural Distinction



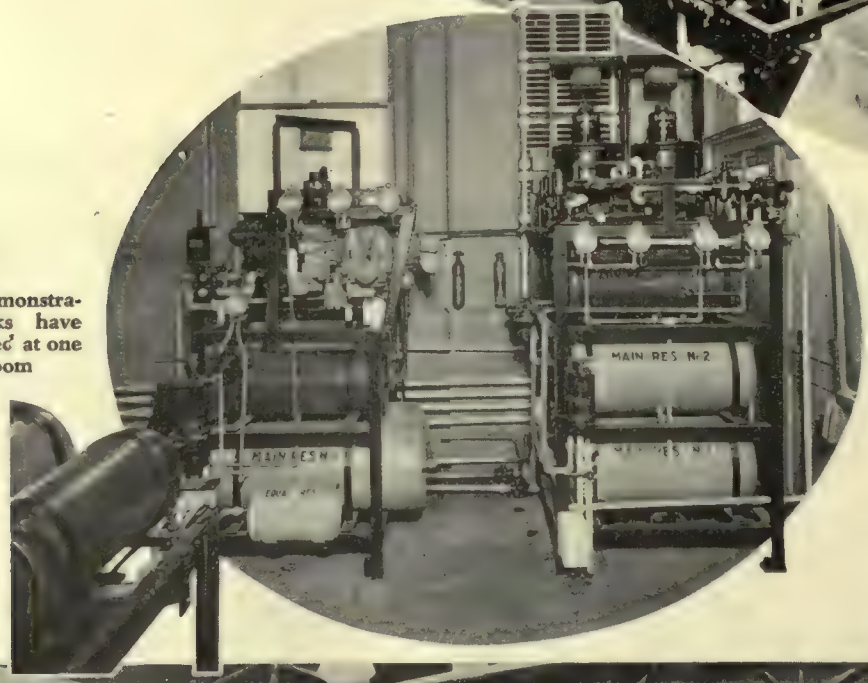
Newest electric railway substation of the United Railways of Baltimore, with two 2,000-kw. converters. It is semi-automatic and was completely in service for the first time in December, 1929. It is early American in style and is the design of Addison F. Worthington, a Baltimore architect. The building was one of three that received honorable mention in the Baltimore *Evening Sun's* annual competition for the most artistically designed business or industrial building erected during the year. It is located in Hamilton, a suburb in the northeastern section of Baltimore.



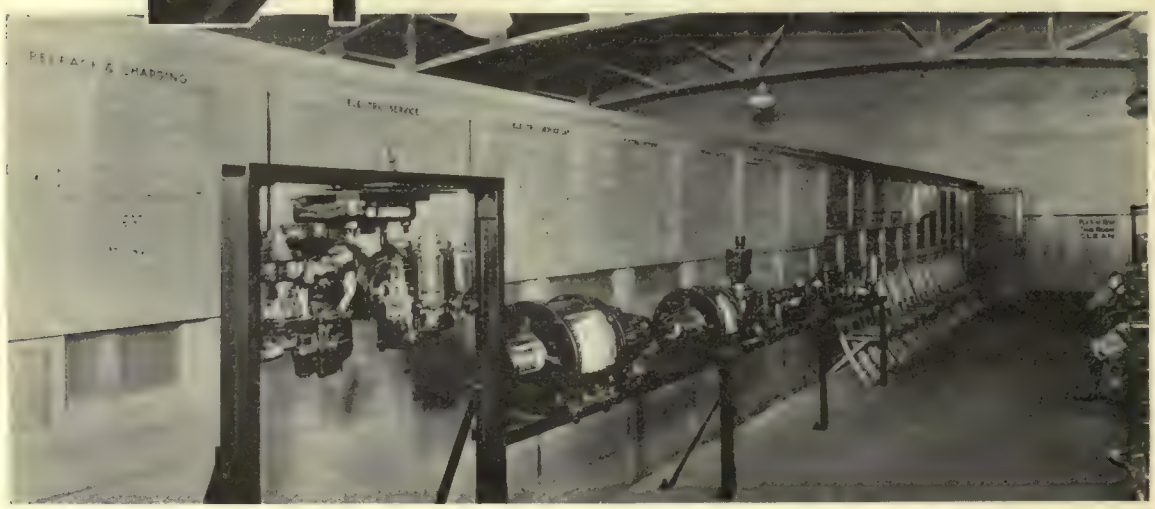
Interior of new instruction school in trainmen's room of 69th Street Terminal



Set up of equipment used on one type of rapid transit car



Brake demonstration racks have been placed at one end of room



Walls are covered with charts and diagrams. Cut sections of individual pieces of equipment are mounted near by



Philadelphia Rapid Transit trainmen receiving instruction in mechanical and electrical details of subway-elevated equipment

Operating Delays Reduced

By Practical Instruction Methods

By

L. E. Summers

Assistant Operating Manager Elevated Division
Philadelphia Rapid Transit Company

DELAY of a few seconds to a rapid transit train leaving one end of the line may easily develop into a ten- or fifteen-minute "drag" before the completion of the trip, and a delay of a few minutes duration as the result of a slight mechanical failure is almost a calamity. It is of the utmost importance, therefore, that each train, when leaving the yards, be as mechanically fit as possible. The track, signal and electrical equipment must be in almost perfect condition, and the employees must be intelligent, alert and resourceful. As a means of developing these characteristics in its subway-elevated men, PRT recently completed the installation of a new instruction department, located in the trainmen's room at the 69th Street terminal of the Market-Frankford subway-elevated line.

P.R.T. management has found that almost all mechanical or electrical defects which develop in service can be temporarily corrected by trainmen if they are thoroughly familiar with details of equipment

The instruction policy of the management, in so far as its subway-elevated employees are concerned, is based upon the premise that practically any mechanical or electrical defect in rolling stock which may develop in service can be temporarily corrected by the motorman or conductor, provided he has been carefully and thoroughly instructed in the details of the equipment he is operating. Although yard inspections and repairs are conducted with the greatest care, it is not possible to eliminate entirely the possibility of a defect's occurring when the



Manipulation of this switchboard by the instructor will produce symptoms of any ordinary type of electrical or mechanical failure

train is in service. In order to minimize the difficulties arising from such occurrences, PRT has carried its instruction program into great detail.

The trainmen's room was decided upon as the ideal location for the instruction department, since this room serves as the gathering place for motormen and conductors with spare moments before, after or between runs. There is no doubt that convenience has played an important part in arousing the interest of the trainmen in their school.

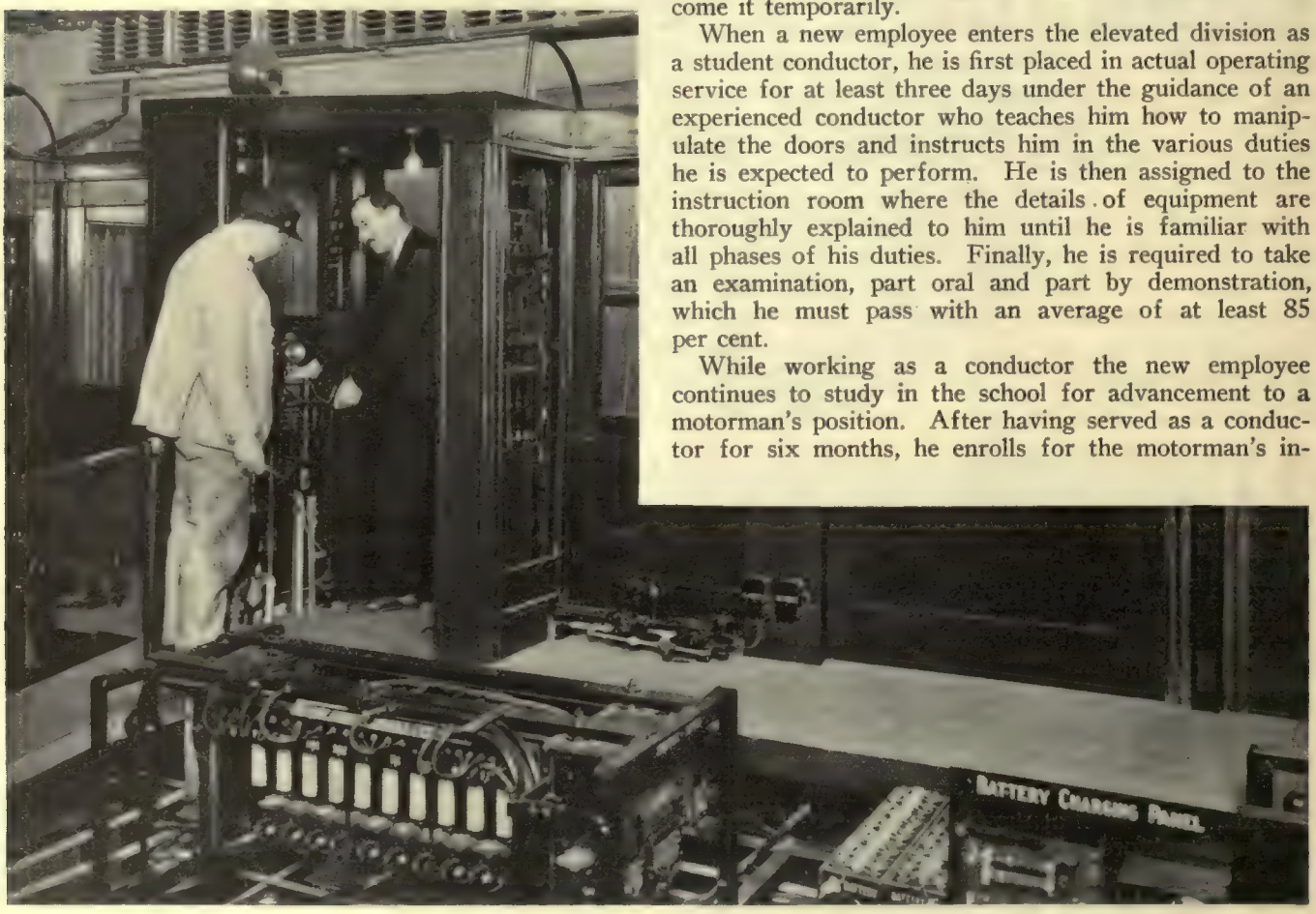
In the instruction room are sections of three full-sized subway-elevated cars, placed end to end and stripped of ceiling, seats and floor. One side of each car has been removed for purposes of clear vision. In all other respects they are similar to those in regular service. Rolling stock on the Market-Frankford line consists of two types of cars: the older Market Street cars, equipped with GE Type M Control and Westinghouse electric-pneumatic AMRE brake equipment, and the more modern Frankford cars equipped with Westinghouse Type ABF control and Westinghouse electric-pneumatic AMUE brake equipment. Thus two types of instruction equipment are required.

A completely equipped motorman's cab has been set up. Doors, door controls, and every air pipe, coil, valve, wire, etc., in and under the body of the cars are exposed to view. Air pipes and reservoirs are painted in different color schemes for purposes of easy identification and explanation. Two brake demonstration racks stand side by side at the end of the room. A complete set of movable couplers is provided to show the trainmen how to couple and uncouple cars. Walls are covered with charts, diagrams and blackboards.

An especially interesting feature is a device whereby the instructor, through manipulation of a switchboard located in the far corner of the room, can produce in the equipment of the cars the external symptoms of practically any failure likely to occur in actual operation. The student, standing in the cab, is assigned the task of determining and temporarily correcting the difficulty. Every defect which might occur in actual operation is manufactured for him, and he is rigidly instructed in the procedure necessary to locate it promptly and overcome it temporarily.

When a new employee enters the elevated division as a student conductor, he is first placed in actual operating service for at least three days under the guidance of an experienced conductor who teaches him how to manipulate the doors and instructs him in the various duties he is expected to perform. He is then assigned to the instruction room where the details of equipment are thoroughly explained to him until he is familiar with all phases of his duties. Finally, he is required to take an examination, part oral and part by demonstration, which he must pass with an average of at least 85 per cent.

While working as a conductor the new employee continues to study in the school for advancement to a motorman's position. After having served as a conductor for six months, he enrolls for the motorman's in-

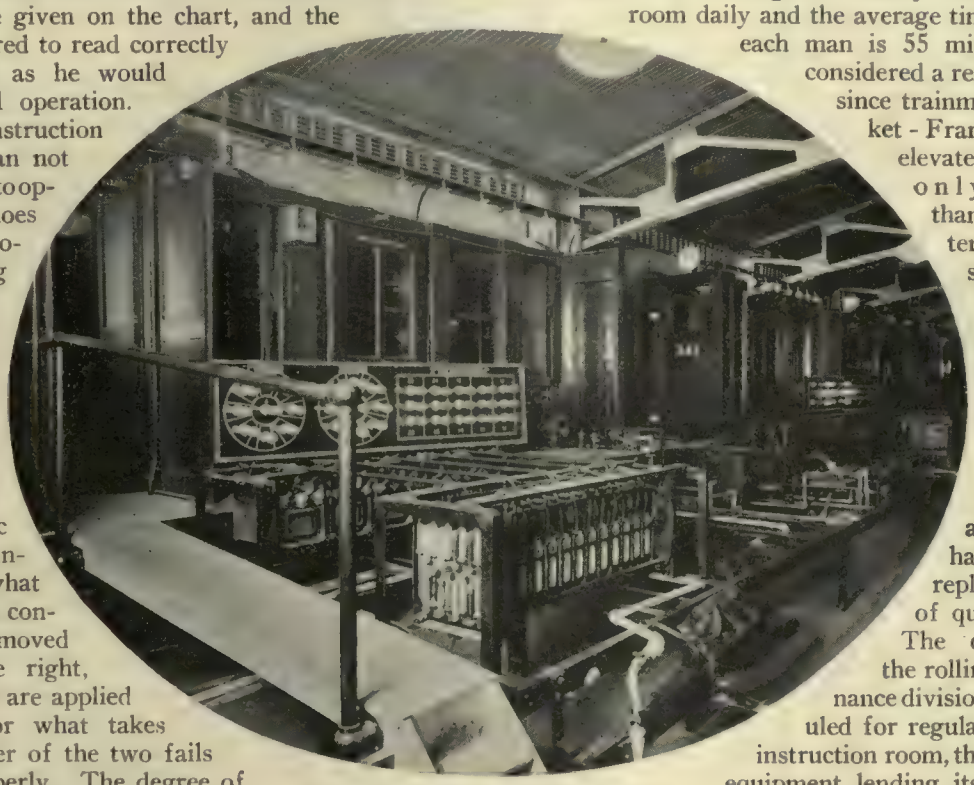


Motorman receiving individual instruction in brake valve operation

struction course. This course consists of one week's actual study of train operation under a motorman instructor. The student is next given instruction on cars in the yard, followed by an examination which he must pass with an average of 85 per cent. The minimum time in which a student may complete this course is eleven days. Instruction is given individually or in groups as occasion and convenience dictate, and by demonstration or lectures.

A chart on which are shown types of signals in use, with their various positions and indications, is used in the examination and instruction of trainmen. No explanations are given on the chart, and the student is required to read correctly each indication as he would see it in actual operation.

Thus, in the instruction room, a trainman not only learns how to operate a car, as does the average motorist receiving instructions for an operator's license examination, but, he learns his lessons to the extent and in the sense in which an auto mechanic learns his. Trainmen can see what occurs when the controller handle is moved to the extreme right, when the brakes are applied and released, or what takes place when either of the two fails to function properly. The degree of thoroughness to which this instruction procedure extends may be illustrated by the fact that the examination for motormen contains a list of 83 questions and that for conductors 35 questions. Not only must new men survive this rigid examination, but all employees must go through the instruction school once a year for brushing up purposes, submitting to the same examination as the beginners, and passing it with the same average. Should either a new or an old man fail to pass the quiz, he is required to attend the instruction school until he has satisfactorily shown his ability to master the questions.



Lights indicating motor and resistor circuits show students where current goes as the various contactors are actuated by controller and sequence switches

Should a motorman or conductor be the cause of an unnecessarily long delay or, as a result of continual checks by members of the instruction department, be found deficient in any point of operation, he is sent to the school for additional instruction. Not until he has clearly demonstrated his ability to prevent a recurrence is he allowed to return to his train. These checks cover the manner in which a motorman stops and starts his train, with particular attention to smoothness and rapidity; the degree of accuracy he maintains in his running time schedules; his response to unexpected signal tests; the conductor's carefulness and time in opening and closing doors and the behavior of both members of the crew in an emergency.

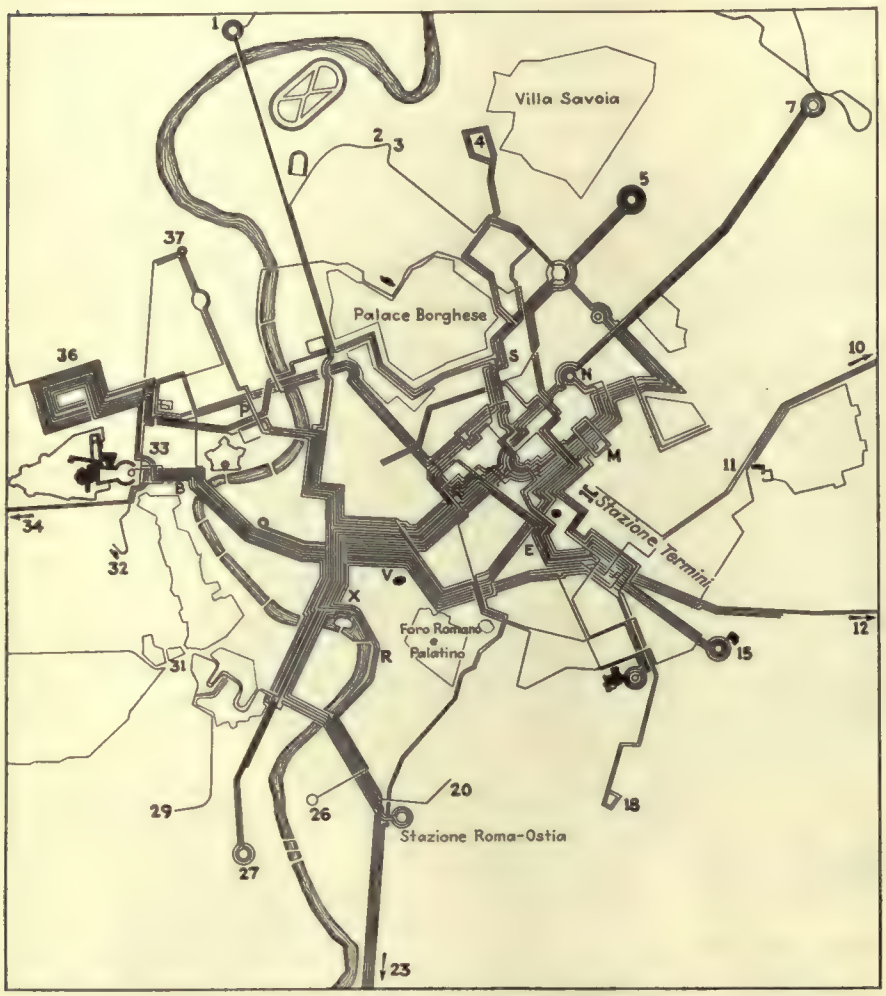
Records of trainmen's voluntary attendance at the school give the best indication of the interest displayed. The instruction room, open seven days and two evenings each week, has supplanted the outside trainmen's room as the gathering place for motormen and conductors during their spare moments. Idle chatter and newspaper reading have given way to pipe line and valve discussions, as men bend over the car "chassis" and pump question after question at the instructors. One motorman, for instance, made 23 visits to the instruction room in the course of a month, spending 61 hours and 35 minutes among the reservoirs and brake demonstration racks. An average of twenty trainmen visit the room daily and the average time consumed by each man is 55 minutes. This is considered a remarkable record since trainmen on the Market - Frankford subway-elevated line number only slightly more than 170. Superintendent of Instruction Harry Keely and Instructor Frank James, who are largely responsible for the organizing and development of the department, are frequently hard pressed for replies to a barrage of questions.

The employees of the rolling stock maintenance division are also scheduled for regular periods in the instruction room, the demonstrating equipment lending itself in an ideal manner to study by these men responsible for inspection and maintenance of rolling stock. Their course of instruction naturally varies in some degree from that of trainmen. Classes for electrical and air brake maintenance employees are conducted each year from September to June. Air brake employees, in the first part of their course, are instructed in the theory of the equipment in the instruction room, each man being required through use of charts and actual equipment to follow the course of the air through all the pipes, reservoirs, valves, etc., explaining the functions of each, and "shooting trouble." These men are then taken into the shop and required to demonstrate their ability in determining and correcting defects in the various valves in the complete brake equipment. Employees working on electrical car equipment are divided into a primary and an advanced group. Their classes are held one night a week in the school, for instruction in the theory of all electrical equipment and for training in locating and repairing trouble.

The remarkable interest on the part of all subway-elevated men has been directly reflected in the delay sheets. Long delays on the line have been considerably reduced as a result of these instruction methods. Experience has proved already that the voluntary visits which the men pay to their school make the routine examinations practically nothing more than a matter of form.

Rome Readjusts Car and Bus

Street cars replaced by buses in business district. Unified transfer system between car and bus. New belt line affords direct communication among districts outside of business area. Special work necessitated by new system installed in four hours. Sightseeing with buses encouraged by municipal transportation system



When street cars went through the business district before lines were taken out of this area, traffic was slowed down considerably due to congestion in narrow streets

1—Piazza Ponte Milvio
2, 3—Acqua Acetosa
4—Villa Vellicelli
5—Piazza Verbano
7—Monte Sacro
9—Q. Itala
10—Portonaccio
11—Campo Verano
12—Acqua Bullicante
15—Santa Croce
16—G. Appio
18—Porta Latina
20—Santa Saba
23—San Paolo
26—Testaccio
27—Staz. Trastevere
29—Monte Verde
31—San Pancrazio
32—San Pietro
33—Vatican City
34—Porte Braschi
35—Santa Maria Pieta
36—Trionfale
37—Piazza Bansizza
B—Ponte Vittorio Emmanuele
C—Piazza Colonna
E—Santa Maria Maggiore
F—Piazza Flaminio
M—Piazza Indipendenza
N—Piazza Pia
P—Piazza Cavour
R—Piazza Bocca Verita
S—Piazza Fiume
T—Piazza Garibaldi
V—Ponte Venezia

COMPLETE rerouting of all street car and bus routes in the city of Rome was effected Jan. 1 of this year. The outstanding feature of the rerouting is that all street cars are excluded from the center of the city, service in that district being given by a number of short bus routes. A double-track street railway belt line surrounds this area and serves as a means of transfer from one route to another. Car and bus routes radiate from this belt line to the outer districts of the city, and several outlying crosstown lines make transfer between the outer districts of the city possible without entering the center.

The plan has been worked out in anticipation of the construction of a subway system which probably will be completed within the next six or eight years, and will give a series of through routes from the outer portions of the city to the principal railroad stations, going underneath a portion of the central district.

For a number of years the transportation lines in the city have been controlled by the municipality through an organization known as the "Azienda delle Tranvie e Autobus del Governatorato di Roma" (A.T.A.G.), but no previous plan has been worked out for a co-ordination of the various means of transportation. The original companies which preceded the municipal consolidation were privately owned and had been consolidated into one system, following the conversion from horse to electric traction many years ago. In 1911 the municipality organized and constructed a small railway system, principally in the outlying districts. Due to the war this system was only slightly expanded, but in 1920 when most of the franchises of the private companies expired, the lines were taken over by the city. The inefficiency of the old transportation system then became apparent and in 1923 plans were begun to rehabilitate and consolidate the lines. These plans have been modified several times and have culminated in the system which has just begun operation.

The main purpose of the consolidation of the street car systems was to facilitate transportation among the various sections of the city and to eliminate transferring from one system to another. While the service was adequate for the city as it existed before the war, growth in the last ten years has been so rapid that it has been

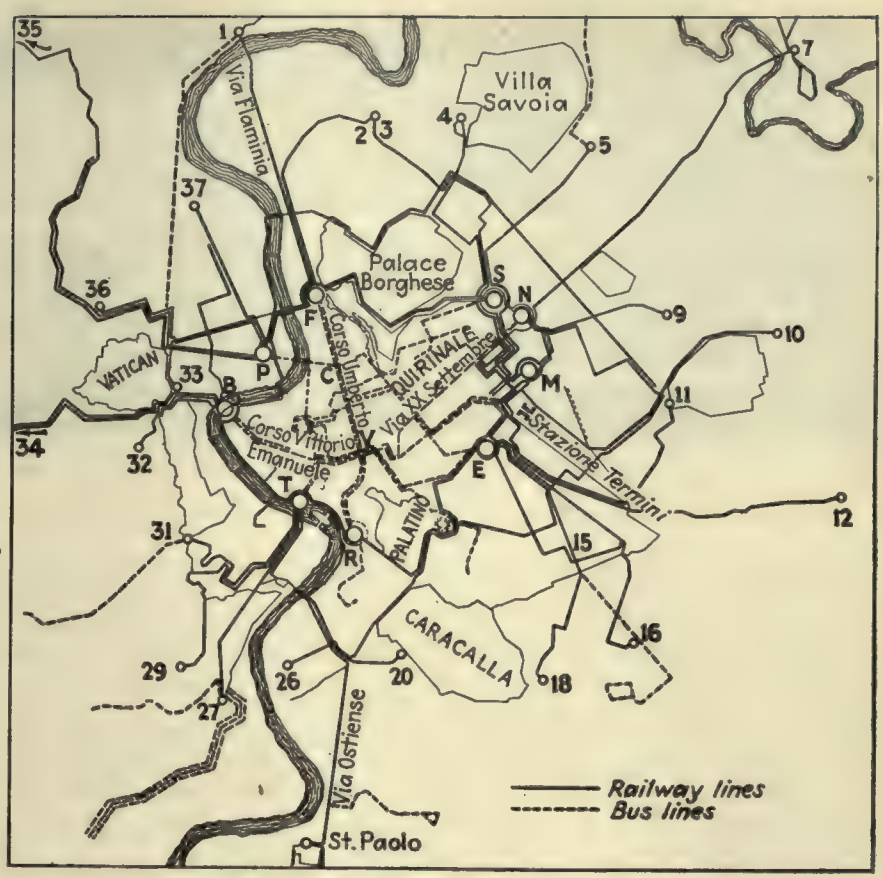
Routes

By

Eng. MARIO ASCARELLI

Manager of Track and Shops
Azienda Tranvie e Autobus del Governatorato
Rome, Italy

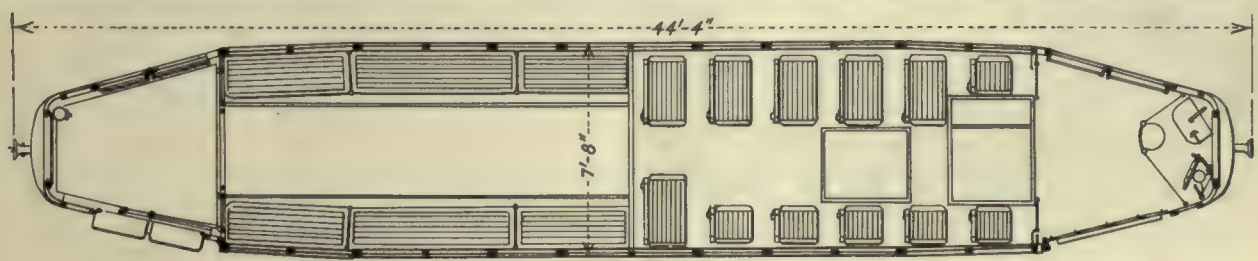
necessary to expand the transportation facilities greatly to keep pace with it. An accompanying table shows the increase in rolling stock and track of the surface lines between Jan. 1, 1920, and Dec. 31, 1929. Rome is one of the few large cities in Europe in which a considerable amount of construction has been undertaken since the war. The total amount spent was approximately 2,000,000,000 lire ($10,600,000). With the construction of 37 miles of track the surface lines have been extended proportionately more rapidly than the population has increased. This expansion program



When surface cars were taken out of business districts, better service was rendered on radial and belt lines

1—Piazza Ponte Milvio
2, 3—Acqua Acetosa
4—Villa Vellicelli
5—Piazza Verbano
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11—Campo Verano
12—Acqua Bullicante
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New street cars of the MRF type have eighteen seats facing forward and twenty seats arranged longitudinally



Train service consists of one motor car and trailer, both of the one-truck type. Cars in these trains have all seats facing forward

was carried out mainly to open up outlying districts where little or no transportation was available.

It was in the center of the city that the greatest difficulty was experienced. No additional street car traffic was possible, as the streets were too narrow to accommodate more vehicles than already were passing through. Rome, like other cities constructed during ancient and medieval times, has crooked, narrow streets, and circuitous routes have to be followed to reach the various districts. Despite the growing difficulties caused by traffic congestion, however, transportation facilities have increased about 10 per cent per year. The congestion finally became so serious that it was necessary to find some sort of relief to prevent a complete breakdown of the system.

As a means of meeting this situation, it was believed that much relief could be obtained if street cars were replaced by buses in the center of the city after the independent companies were taken over. This plan was first put in operation in 1927, when a few privately owned lines were acquired, but the resulting improvement was insufficient to solve the increasingly serious traffic problem. Certain street car lines had been eliminated or replaced by buses as an experiment, however, and the results indicated that this plan would bring some relief from congestion. Accordingly, between 1927 and 1929, plans were made for a replacement of all street cars by buses in the central business district of Rome. The entire transportation system has been laid out with the idea that ultimately passengers will be carried from outlying districts to the business centers by means of a subway in addition to other means of public transportation.

Simplification of Routing Basis of New Plan

In making the traffic survey for the new routes, it was found that the principal difficulties of the old street car service could be summarized under three heads:

1. There were too many long lines with infrequent headways, irregular service, and indirect routes.
2. Many lines went through the congested district.
3. All cars covered the entire line and were heavily loaded in the center and almost empty at the ends.

Accordingly, in order to provide uniform means of traffic circulation in the central zone after it definitely had been decided to remove street cars from the congested

Table I—Growth of Rome Street Car System 1920-1929

	Jan. 1 1920	Dec. 31 1929
Miles of track	93	130
Number of track switches	400	831
Substation capacity, a.c. kw.	4,400	10,100
Substation output, kw.-hr. per annum	20,000,000	60,000,000
Carhouse capacity, cars	550	1,000
Cars available	500	900



Electric buses are of the battery type and accommodate 18 seated passengers and 22 standees

Table II—Comparison of Old and New Services in Rome

	Before Rerouting	After Rerouting
Miles of street with track	72.5	58.9
Miles of double track	130.2	104.8
Miles of street car route	217	...
Miles of bus route	67	...
Total miles of line	284	154
Number of street car routes	51	33
Number of bus routes	26	23
Number of car trains	486	400
Number of buses	91	200
Seats and standing room offered per hour per mile of route	125,000	123,100
Car-miles run per annum	24,200,000	
Bus-miles run per annum	2,800,000	
Total vehicle-miles per annum	27,000,000	26,040,000
Schedule speed of street cars, m.p.h.	6.63	7.44
Schedule speed of buses, m.p.h.	6.51	7.13
Energy used per annum by street cars, kw.-hr.	55,900,000	
Gasoline used per annum by buses, gallons	841,500	

Table III—Classification of Routes

	Before Rerouting	After Rerouting
Total number of tramway routes	51	33
Inner belt routes (two directions)		2
Radial lines		26
Outlying crosstown lines		3
Suburban lines		2
Total number of bus routes	26	23
Through routes in center		8
Lines entering center		3
Suburban lines		11
Radial line		1
Average length of route, street cars	4.3	2.5
Average length of route, buses	1.5	2.0

Table IV—Types of Street Cars of the Rome System

Type	MRS	CT-135	Trailer
Number	100	370	200
Class	Double truck	Single truck	Single truck
Number of windows	7	8	8
Two motors per car; horsepower of each	56	58	...
Brakes	Air	...	...
Over-all length	44 ft. 4 in.	...	...
Seating capacity	38	24	24
Standing room	47	21	25

Table V—Buses of the Rome System

Type	34-S.P.A. Short	34-S.P.A. Long	Lancia Omicron Long	Lancia Omicron Short	Electric Battery VAI
Number	70		160		40
Length	28 ft. 4 in.	30 ft. 10 in.	32 ft.	28 ft. 4 in.	21 ft. 4 in.
Width	7 ft. 6 in.	7 ft. 6 in.	7 ft. 9½ in.	7 ft. 9½ in.	7 ft. 6 in.
Seating capacity	16	24	26	18	18
Standing room	30	24	24	28	22
Weight, pound	13,860	14,960	15,620	13,640	14,740
Rating, horsepower	45	45	97	97	16



A Lancia bus of the Omicron long type affords seats to 26 passengers and room for 24 standees, and has a rear exit

business area a study was made to determine where the limits of the district could be established. Due to the topography of the city, which is hilly, and the various old monuments and buildings which can not be removed as being the last samples of a bygone civilization, traffic is slowed down considerably, and it was found impossible to give the exact limits of the district. Accordingly, a zone was laid out which includes practically all of the old Papal City excepting the Borghi and the Trastevere areas and also a part of the newer city. A double-track belt line encircles this district.

From the belt line the street railway routes radiate outward, having their outer terminals in the suburban districts. These lines enter the belt line at nine points where passengers can transfer directly to the latter or to the buses which run into the business district.

From these intersections the series of bus lines pass through the central points of Rome including the Piazza Colonna and Piazza Venezia.

In order to facilitate direct communication among outer portions of the city, it was planned to have a second or outer belt line, but since there appeared to be no need for carrying this line completely around Rome, only parts of the proposed route have been put in operation in the northwest, northeast and southeast sections. In addition to the surface lines which go out to the suburban districts, several bus lines serving these territories have been retained. They will be replaced by electric service, however, as soon as the traffic increases to such an extent that the change is desirable from the viewpoint of efficient transportation.

The fare system has been changed because the number of direct through lines was reduced and also to encourage passengers not going to the center of the city to take routes which do not enter the congested area. It was also desired to increase the riding habit of the public on the street cars because the latter have lower operating costs than buses.

Under the new arrangement the city can be considered as divided into three zones. First, the central zone in which service is given by buses only; second, the outer zone, which is served by street cars exclusively, and third, the suburban district which is served by street cars



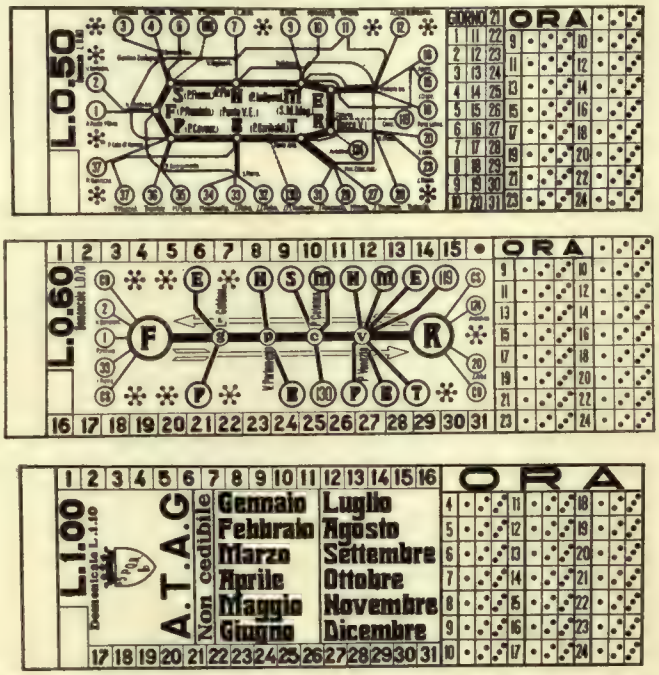
While new trackwork was installed service was continued uninterrupted over old track

and independent bus lines. There are some exceptions to this arrangement, where bus lines are being run beyond the inner belt line and reach points in the intermediate zone. This was done because no track construction was possible in the districts thus served, which needed transportation facilities badly.

Transfer between street cars and buses is available to those passengers traveling from the center of the city to the outer districts and back. Separation of the routes improves service for both cars and buses, and reduces traffic delays in the center of the city. Another advantage is the flexibility of the routes, which can now be changed easily without disrupting the entire system.

The layout of the service is shown in an accompanying diagram. The belt line connects the nine principal transfer points indicated by letters. The bus lines are indicated by the initials of the two terminals they connect. The cars of each route carry the same number as the one given for the outer terminal.

In the new fare system, it was considered desirable to discourage the transit through the central business area of passengers who did not have to stop there. Although the fare system was wholly revised it was considered necessary to retain the existing minimum fare. New tickets were issued permitting transferring for a continuous trip from one point in the city to another, but the ride was limited to one direction only. The number of transfers permitted depends entirely on the routes of the lines involved. Two transfers are necessary when the entire trip is made by a street car and one transfer when the trip is made by buses or by a combination of bus and car. The time limit of the tickets has been set at one hour as it was considered that this was time enough to reach any transfer point during one continuous trip. In order to keep within this time limitation, three types of transfers have been provided. The first is priced at 50 centesimi (2.6 cents). This is the old rate and the ticket is good on street cars only. The second type of ticket is priced at 60 centesimi (3.2 cents) and is good on buses or a combination of car and bus. The third ticket, costing 1 lira (5.26 cents), is good for travel from one side of the city to the other. The car ticket shows the various routes and transfer points. The ring in the center represents the belt line surrounding the central business district. The bus ticket is similar except that it covers a specific route between two of the transfer points. These two tickets, with an extra fare for entering the business area, will keep practically all the passengers in the outer district who do not have to transact business in the restricted zone. The 1-lira ticket is good on all cars or buses for the date and hour punched, and has been in use for several years. Corresponding to each of the three types of tickets there is a season ticket, which eliminates paying a fare each time bus or car is boarded.



Three different types of transfers are issued for the unified service

A comparison of the old and new services is given in an accompanying table. It will be noted that there has been a material reduction in the number of miles of street in which car tracks are used. While the old rails have not been torn up so far they have not been used since the beginning of the year. There has been a reduction of 25.4 miles of double track. Due to the elimination of duplication of routing, the total miles of car routes and bus lines has been reduced from 284 to 154, a saving of 130 miles of route. The principal saving is in the reduction of the number of car lines from 51 to 33, although the bus routes have been decreased from 26 to 23 only at the same time. The number of car trains has been greatly reduced, while the number of buses in service now is more than double. The total number of vehicle-miles per annum, however, has been decreased slightly, while it will be noted that the scheduled speed both for cars and buses has been increased a little over 10 per cent. The number of car and bus routes and the number of lines serving the various territories are given in an accompanying table. A list of the various types of rolling stock operated by the transportation system is given in tables 4 and 5, which list the cars and buses separately. In addition a few cars and trailers of an old type are being retired.

About two months of construction work was necessary and a new electric substation was installed. This new substation transforms 8,000 volts a.c. to 600 volts d.c. through mercury vapor converters with a rating of 350 kw. built by the Societa Officine Subalpine of Turin. Cables for the distribution system have been installed to an aggregate length of 6.2 miles. It also is expected that a new substation with a rating of 2,000 kw. will soon have to be installed in the Piazza San Pietro.

The most important track construction was the installation of special work at the newly created transfer points, while some sections of nearby lines were connected in order to complete the inner belt line. Apart from these changes comparatively little new track work had to be laid. The change-over of the old system to the new was effected in four hours on New Year's Day, from 1 to 5 a.m. The new installation comprised 12.2 miles of track, 106 switches and 362 frogs.

In order to familiarize the public with the new routing, signs were placed at all transfer points and at various locations along the line, where sections of maps and tables were also available.

EDITOR'S NOTE—Since the new system was put in operation Jan. 1 of this year, there has not been sufficient time to determine whether the results are satisfactory. Conflicting reports have been received at this office. Definite information is awaited with interest.

Electric Coaches Installed

on New Orleans Shuttle Line

By

W. S. Rainville, Jr.

Equipment Engineer New Orleans Public Service, Inc.
New Orleans, La.



Equipped with two 50-hp. motors each, the New Orleans electric coaches are capable of attaining a maximum speed of approximately 25 m.p.h. and maintaining a schedule speed of more than 10 m.p.h. This view shows the Twin Coach on Carrollton Avenue.

Two vehicles being operated on short feeder route through residential and business districts. Company seeking experience to determine possibilities of this type of vehicle on other light traffic routes

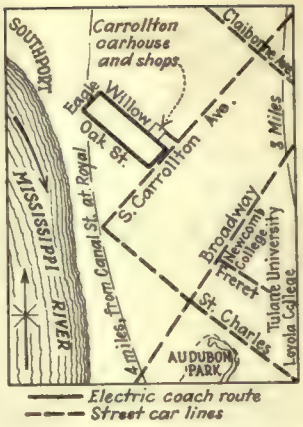
CONFRONTED recently with the necessity for rebuilding track on a short, unprofitable street car line, the New Orleans Public Service, Inc., decided to substitute trackless trolleys. The management felt that the substitution would not only put the line on a paying basis, but would also afford an opportunity of becoming familiar with this type of vehicle and studying its possibilities for use on other railway lines with light patronage.

Two electric coaches were purchased, one from the Twin Coach Corporation and the other from the American Car & Foundry Motors Company. On Dec. 2, 1929, the two 28-passenger, single-truck cars were withdrawn and the new vehicles placed in service. The route, which is 1.214 miles in length, parallels the Carrollton Avenue street car line in the western part of the city for two blocks, extends northwest on Oak Street to a district called Southport, goes two blocks northeast on Eagle Street and then back to Carrollton Avenue by way of Willow Street. With the exception of two short blocks the entire route is over paved streets. On Willow Street, where the street car tracks were eliminated, new paving was laid in 1929.

The cash fare of 7 cents charged on the electric coach line is the same as on the company's car lines. Transfers are accepted from other car lines and are issued free. A headway of eight minutes is maintained on the route by one coach, the other coach serving as a standby.

The total daily mileage of the operation is approximately 175 miles, the coaches being alternated in morning and afternoon service. Although this operation is a small one, it is sufficient to familiarize the distribution, transportation and rolling stock and shop departments with electric coach operation.

Overhead construction for the route is of the simplest type, the same materials being used as in the street railway overhead system on tangent and curve construction. Both positive and negative trolley wires are of No. 00 copper, spaced 24 in. apart. Positive feeder taps are essentially the same as those used for the previous street car operation. The negative trolley wire is grounded to existing rails on near-by streets at several points. There are no spring frogs, special insulated crossings, wyes or loops in the installation.



Relation of the new electric coach line in New Orleans to the Carrollton Avenue and other near-by street car lines. Although only 1.214 miles in length, the route goes through a business district and a well-built-up residential section

Electric Coaches Are of Latest Design

The electric coach supplied by the American Car & Foundry Motors Company is constructed entirely of steel along the lines of the A.C.F. "Metropolitan" bus. It weighs 19,000 lb. and is mounted on 38x9-in. tires, with duals on the rear. An entrance door is located behind the front wheels, and a treadle-operated exit door is at the rear. National Pneumatic electro-pneumatic door control, with full brake interlock safety features, is provided. The coach has a nominal seating capacity of 40 passengers, but this was cut to 38 by removing two seats from over the forward wheel housing at the right.

This vehicle is powered with two General Electric 298, 50-hp., automotive type railway motors. They are supported rigidly from the body framing and are connected to a Timken inverted worm-drive axle by two single section 3½-in. tubular drive shafts provided with two all-metal joints per shaft. A gear reduction of 11 to 1 is used. The motors are controlled by the General Electric type PCM foot-operated automatic control, without dynamic braking. The main motor controller is located in a compartment beneath the rear cross-seat. This unit can be reached for inspection by removing the rear seat or an exterior panel in the rear of the coach. The controller includes three contactors for making the series and parallel connections of the motors, two line breakers for the positive and negative trolley leads, an overload relay, an accelerating relay and two motor cut-out switches. The resistor portion of the controller is operated by a camshaft driven by an air engine. Nine series and nine parallel steps are provided, so that the current changes on each step are small.

Operation of the main controller is by a master controller mounted in the floor of the coach at the operator's position. The pedal on this controller has four operating positions—off, switching or holding, full series running and full parallel running. Movement of the pedal is about 3 in. and only a very slight pressure is required.

The motor reverser, which is mounted horizontally at the driver's left, is of the hand-operated drum type, with three positions—forward, off and reverse. This device is so arranged that the control circuit is complete only when the handle is in one of its operating positions. Motor resistors are of the edgewise-wound ribbon type. Current collection equipment includes 4-in. Kalamazoo wheels, the Ohio Brass Company's swivel harp, 18-ft. 6-in. poles, the O.B. Form 5 trolley base and O.B. trolley retrievers.

Brakes on the A.C.F. electric coach are of the four-wheel air-operated type. The CP-25, 10-cu.ft. air compressor, MJ compressor governor and VB-2 foot-operated brake valve are of General Electric manufacture. The air brakes are supplemented by a mechanical hand brake, consisting of a 16-in. disk brake mounted on each propeller shaft. This is controlled by a lever to the right of the operator.

The electric coach manufactured by the Twin Coach Corporation is constructed of Plymetl and steel, weighing 16,500 lb. completely equipped. It is mounted on single 40x10½-in. medium pressure tires in the front and 38x7-in. high pressure duals on the rear. The entrance door on this coach is located ahead of the front wheels. The circulating load feature is provided by a treadle-operated exit door in the rear. This coach has a seating capacity of 42 passengers and is equipped with bellows type seats, upholstered in rattan.

Two Westinghouse No. 1426, 50-hp. automotive type



The trolley poles of the coaches are 18 ft. 6 in. in length, permitting a wide range of travel on the streets. In this view the A.C.F. coach has swerved far from the line of the overhead to receive passengers at the curb

railway motors are used. These are connected to the special Timken-Twin Coach underslung dual worm axle by two 2-in. diameter shafts with Cleveland Universal joints at each end. The motors are controlled by Westinghouse type-VA foot-operated automatic control, without dynamic braking. All main control apparatus is located under the rear seat, accessible from both the interior and exterior of the coach.

The motor control equipment is operated by a master controller mounted beneath the floor and connected to a pedal at the operator's position. The motion of the controller drum operates the main circuit switches directly and also changes the setting of the limit relay. In this manner the rate of acceleration is governed by the distance to which the accelerator pedal is depressed.

To the left of the operator is mounted the motor reverser, of the hand-operated type and with four positions—off, forward, reverse and emergency braking. The main resistors are of the edgewise-wound Type M, and are mounted beneath the floor. Current collection equipment is the same as that for the other coach.

Brakes for the Twin Coach are of the four-wheel air-operated type, using ABS Brakebloks and gun iron drums. The DH-10 air compressor, R-414 compressor governor and B-4 brake valve were furnished by the Westinghouse Traction Brake Company. The air brakes are supplemented by an emergency brake consisting of two drum-type driveshaft brakes actuated by a hand lever.

Both vehicles are housed in the Carrollton Station and are inspected and maintained by the regular carhouse crew. Because of the simplicity of the electric coach no skilled mechanics are required. It is the intention of the company, however, to place pitmen in the bus garage for short periods so that they may become familiar with the rear axle, steering mechanism and other distinctly automotive parts. Inspection and greasing have been placed on a 2,000-mile basis. One of the street car inspection pits has been adapted to the use of the electric coach by installing guard rails along its sides. A negative wire is suspended in the carhouse, parallel to the street car positive wire, for bringing coaches over the pit. A portable outfit for inflating the tires was constructed a DH-16 railway air compressor and two air reservoirs being used. With the exception of a Manley Hi-lift jack, no special equipment has been purchased for the maintenance of the new vehicles.

Road Builders Recommend Relief of Paving Obligations

VARIOUS recommendations directly affecting electric railways were embodied in the report of the sub-commitee on street railway tracks and paving of the American Road Builders Association presented at Atlantic City, Jan. 13-18. The conclusions in the report were based on a survey covering some 4,000 miles of track. Particularly significant is the recommendation that the cost of paving in the track area should not be borne by the railway alone.

Girder rails varying in height from 6 in. to 9 in. are used in 80 per cent of the cities, according to the report. The 7-in. girder rail is the most popular. Girder rails have many advantages over the T-rails from the paving engineers' standpoint. The low joints which were so common in old track construction, with their resulting breaking of the pavement, seem to be overcome through the general use of a combination bolted and welded joint.

The use of wood ties predominates, according to the committee. A few cities use both wood and steel ties, and some use only steel ties. The majority of the users of wood ties use broken stone or slag ballast from 6 in. to 8 in. thick, while the users of the steel tie use 8 to 12 in. of concrete, or from 6 to 8 in. of broken slag or stone for ballast under the ties. Concrete is quite generally placed between and over the ties to support the paving surface or for the surface itself. Brick, stone blocks and concrete are used in about equal amounts for the paving within the track area. Some asphalt paving is used, especially along the outside of the rails. The roadway pavement wearing surface is carried to the outside rail in about 60 per cent of the surveyed cities.

The survey disclosed the fact that in 70 per cent of the cities, the city engineer determines the type of track construction, and in 75 per cent of the cities he supervises the track and paving construction, although 80 per cent of the railway companies pay for the paving in the track area. In only two instances does the city maintain, at its own expense, the pavement in the track area, and in only two other instances does it do the maintenance at the expense of the railway company.

After pointing out the heavy expense involved in construction of a suitable pavement, the committee suggests that the public, as represented by the taxpayer or the users of motor vehicles, should contribute toward the paving of that portion of the roadway within the track area. Under this arrangement, it is intimated that a more substantial type of track construction might be provided, which would be of advantage to both the users of the railway cars and bus and automobile riders.

In the construction of street railway tracks, in city streets, the committee believes the most permanent type possible to be obtained should be adopted. The sub-base for track construction should be thoroughly drained and unyielding. Special effort should be made to produce such a result, and, if necessary, a sub-base of concrete should be provided, in order to secure a firm base. In cities where an 8-in. concrete slab has been used as a sub-base, the results have demonstrated its superiority over other types. Experience seems to indicate that, from the standpoint of paving surface, the best results can be obtained by the use of grooved rails, although some cities seem to be getting fairly good results with T-rails. With grooved rails it is much easier to secure and maintain a satisfactory paving surface, since the pavement can be finished flush with the steel. With such construction the cross movement of traffic is greatly facilitated.

It is felt that the use of brick and stone block paving in the car tracks gives more satisfactory results than other types. The block type, with asphalt filler, is easily removed when repairs to the rails are necessary, and absorbs more readily the vibration set up by car traffic.

Whatever the design of the track construction and its paving, it seems logical to make a complete separation between the roadway pavement and the track structure. Each should be capable of supporting the maximum traffic loads independent of the other.



Comfortable travel through sections of scenic beauty is provided by many intercity bus routes

De Luxe Bus

Finds Wide Application

WITHIN the past five years, no phase of surface transportation has expanded more rapidly than has that of intercity bus operation. At the beginning of 1930, a total of approximately 29,500 buses, most of which are of the de luxe type, were regularly rendering such service over 300,000 miles of route. Nearly 33,000 miles of intercity lines, both intrastate and interstate, were added in 1929. The electric railways of the country have been among leaders in this development. They have extended their fields of operation with new intercity lines, in many instances through territories already served by interurban cars, have absorbed competing independent bus companies and co-ordinated the selective services, and have stabilized intercity operation in a number of instances by the abandonment of long unprofitable interurban car lines and the substitution of more direct, fast and comfortable bus routes.

Important factors contributing to the progress in intercity bus transportation are the luxurious features of the buses themselves, the growth of convenient terminals, the extension of improved highways, the co-ordination of interline services and the extensive merchandising of nation-wide travel by bus. The great majority of buses now being used on long distance routes are comparable in comfort and convenience to the private automobile, with adequate facilities for handling small baggage. They travel on the newest and most direct highways between two cities, beginning and ending the trip at comfortable, centrally located terminals where connections with other lines are made with minimum delay.

Co-ordination of interline services and the joint use of terminals by two or more companies, serving different territories, are the two factors which are doing most to stabilize intercity bus operation. Facilities on a network of routes covering the whole country are gradually assuming the form of one large unified system. Not only is this true of the routes themselves, but it is true from operating, economic and maintenance standpoints. Interline agreements and service arrangements between the Pennsylvania-Ohio System and the number of through bus lines operating in the state of Ohio form a notable example of this co-ordination. Practically every bus line from the West or Middle West, traveling to the Eastern states, passes through the state of Ohio and into the town of Youngstown. In Youngstown a central terminal is maintained and operated by the Pennsylvania-Ohio System to which all these through lines report for the interchange of passengers. Mechanics and service equipment are located at this terminal for the use of any line.

Unification of intercity systems and construction of improved highways have been major factors in the steady expansion of long-distance bus operations. Increasing popularity of this type of service promises continued growth

in Interurban Service

By

J. R. Stauffer

Assistant Editor
Electric Railway Journal

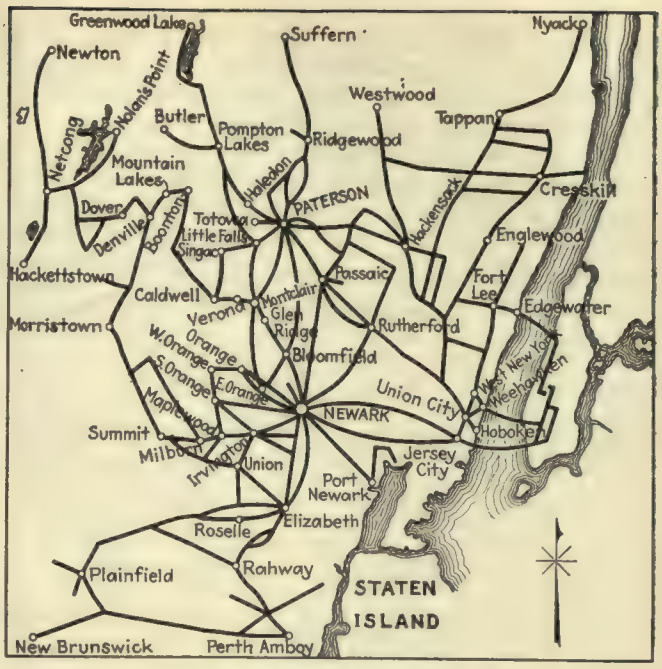
Efforts to secure as many direct interline connections and as many interline joint tariffs as possible with other lines in this district have resulted in suitable arrangements with practically every operation which would be of value to the system in the state. A rather unusual agreement for the sanding of hills during icy weather has been made. The through lines purchase the sand or ashes, the Pennsylvania-Ohio System transports it to important points along the routes and the highway department of the state does the actual spreading.

A comparative study of intercity de luxe bus operations as carried on by three companies will be found in an accompanying table, showing details of fare structures, territories served and equipment used.

Public Service Co-ordinated Transport, operating throughout the entire state of New Jersey, is the largest bus operating organization in the United States. In a consideration of intercity bus operation a great majority of the local lines could properly be put under that classification, as their services join more than 300 municipalities in the state. Two accompanying maps show interstate and intercity bus routes in north and south New Jersey. The operations extend into New York from northern New Jersey and into Philadelphia from southern New Jersey.

Interstate service is operated to New York City from Nyack, New York, Elizabeth, Montclair, the Oranges, Maplewood, Paterson and Passaic, all in New Jersey. From Philadelphia, Pa., lines operate to New Jersey to Vineland, Millville, Bridgeton, Pennsgrove and Billingsport. A number of de luxe intercity bus operations are carried on wholly within the state operating from the cities of Newark, Paterson, Camden and New Brunswick.

The Cincinnati Street Railway has operated for the past two years a de luxe motor coach line during the morning and evening rush hours between Government Square and Avondale, a one-way distance of 4.6 miles. One bus was used in this service, making two trips inbound in the morning and three trips outbound in the evening. In the morning no one patronized the line outbound and in the evening only one or two used it inbound. At first the public was slow to use this service, but patronage grew until there was sufficient demand for this high-class service all day, so four new buses were purchased. These coaches, designed for 29 passengers, were equipped to seat only 25, giving 36 in. between seats. This made it possible for a person sitting next to the window to leave without disturbing the person on the aisle. Provision for two card tables was made at the rear, where the last two seats over the wheel casing face backwards.



Public Service operates an extensive intercity service in northern New Jersey

The route was extended a mile further to Avondale Heights, a new and highly restricted subdivision, and an all-day schedule was put into effect on Nov. 25, 1929. The new schedule called for a half-hour headway between 7:30 a.m. and 8:30 p.m. and hourly service from 8:30 p.m. to midnight. The fare on this line was established at 25 cents, with five tickets for a dollar, no transfers and no standing passengers.

During the latter part of December, patronage grew during the rush hour until certain trips had to be double-headed. This continued after the holidays, so on Jan. 13, 1929, a new schedule, giving fifteen-minute service during the evening and morning rush hours between Government Square and old Avondale, and 30-minute service to the Heights, was placed in effect. Service outbound after 6:30 p.m. and inbound after 7 p.m. was discontinued, as experience had shown it was not patronized. The line competes with an independent bus operation at a 10-cent fare and a street car line over about 60 per cent of the route, and with a 10-cent bus line belonging to the Cincinnati Railway over about 85 per cent of the route. Despite all this the receipts are gradually increasing and it is estimated that the line will be on a paying basis within a period of twelve months.

The Twin City Rapid Transit Company, Minneapolis, Minn., furnishes without competition all the local bus transportation in Minneapolis, St. Paul and suburban territory. De luxe bus service is operated on eight lines of which the total route mileage is approximately

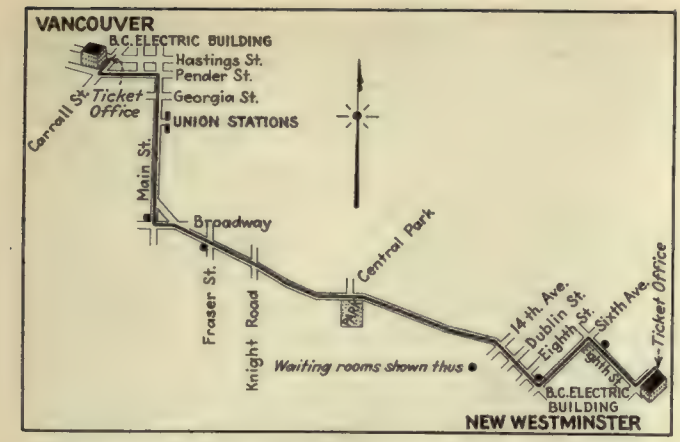
97 miles. Three of these lines, with a total of 52 miles, operate into suburban districts. All serve territories having street car lines, thus giving the district preferential service but over different routes.

The fare on two of the three intercity de luxe bus lines, operating between the loops of Minneapolis and St. Paul, a distance of about 10 miles, is 25 cents for the entire distance, or any portion thereof. On the third intercity line tokens are sold at the rate of two for 25 cents, one token being accepted as fare within the limits of either Minneapolis or St. Paul, the intercity ride requiring two tokens. A passenger making the Minneapolis-St. Paul trip by street car is required to pay a fare in each city, the present fare being 10 cents cash, or a token sold at the rate of six for 45 cents.

The speed on the intercity buses between the loops

Comparative Study of Twenty-Six Intercity De Luxe Bus Routes

Company	Line	Mileage One Way	Equipment Used	Cities or Towns on Route	Other Transportation on Route	Through Fare	Fare on Competing Lines	Headways	Speed M.p.h.	Speed of Competing Lines M.p.h.	Stan-dees
The Connecticut Co. New Haven, Conn.	New Haven to Bridgeport	18	Type Y Yellow Coaches	West Haven Milford Stratford	Interurban car circuitous route	60c.	5 tokens @8⅓c. cash 50c.	1 hour	17.68	13.22	Yes
	Bridgeport to East Derby	14.5	Type Z Yellow Coaches	Stratford Shelton Derby	Bus service replaced interurban car	4 tokens @8⅓c. cash 40c.		1 hour	19.49		Yes
	Meriden to Middletown	9	Type Z Yellow Coaches		Bus service replaced interurban car	30c.		1 hour	22.44		Yes
	Meriden to Wallingford	7	Macks	Yalesville	Bus service replaced interurban car	3 tokens @8⅓c. cash 30c.		30 min.	14.74		Yes
	Meriden to New Britain via Berlin	11	Whites	Berlin	Interurban car via Plainfield & Southampton	4 tokens @8⅓c. cash 40c.	4 tokens @8⅓c. cash 40c.	40 min.	16.78	16.09	Yes
	Hartford to New Britain	11.5	Yellow Coaches	West Hartford	Interurban car	3 tokens @8⅓c. cash 30c.	2 tokens @8⅓c. cash 20c.	1 hour	13.92	14.56	Yes
	Norwich to Putnam	35	Yellow Coaches		Bus service replaced interurban car	11 tokens @8⅓c. cash 1.10		1 hour	19.67		Yes
Pennsylvania-Ohio Public Service Corp. Pennsylvania-Ohio Coach Lines Youngstown, O.	Youngstown to Cleveland	70	6 cyl. Whites 35 passenger	Girard, O. Niles, O. Warren, O. Chagrin Falls, O.	Erie R.R. Penna R.R.	$2.00	Erie $2.39 Penna $2.39	2 hours	24.0	42.0	No
	Youngstown to Akron	50	Fageols 33 passenger	No incorporated communities	Erie R.R. B. & O. R.R.	$1.60	Erie $1.92 B. & O. $1.92	2 hours	26.0	40.0	No
	Newcastle, Pa. to Cleveland via Youngstown	90	6 cyl. Whites 35 passenger	Youngstown, O. Girard, O. Niles, O. Warren, O. Chagrin Falls, O.	Interurban car Youngstown to Newcastle	$2.50	Youngstown Newcastle 45c. Bus 75c.	4 hours	24.0	40.0	No
	Youngstown to Greenville, Pa.	30	Fageols 26 passenger	Hubbard, O. Sharon, Pa.	Erie R.R.	$1.00	$1.10	3 hours	24.0	30.0	No
	Youngstown to Warren	15	4 cyl. Whites 25 passenger	Girard, O. Niles, O.	Interurban car Erie R.R.	50c.	Cash 40c. Tickets 30c. R.R. .51	1 hour	20.0	13.0 30.0	No
	Sharon to Newcastle, Pa.	24	Fageols 26 passenger	Farrell, Pa. W. Middlesex, Pa. New Wilmington	Penna R.R.	$1.00	.72	2 hours	24.0	36.0	No
	Youngstown to Sharon	15	Fageols 26 passenger	Hubbard, O.	Interurban car Erie R.R.	50c.	40c. .51	1 hour	25.0	35.0	No
Northern Ohio Power & Light Co. Cleveland-Akron-Canton Bus Co. Akron, Ohio	4 Routes from Akron to Cleveland via (a) State Road (b) Hudson Road (c) Brecksville Road (d) Broadview Road	38.9 41.6 37.85 35.45	Twin Coaches Whites Yellow Coaches	Northfield Hudson Brecksville W. Richfield	Interurban cars and railroad	$1.40	Interurban car $1.00 Railroad $1.34	30 min. to 1 hour alternating between 4 routes			Yes
	Akron to Canton	24.40	Twin Coaches	Uniontown Greentown N. Canton	None	70c.	No comp.	30 min. to 1 hour			Yes
	Canton to Wooster	33.90	Whites	Massilon Dalton East Union	None	$1.00	No comp.	Every 2 hours			Yes
	Canton to Dennison	40.10	Yellow Coaches	N. Industry Dover New Philadelphia	None	$1.50	No comp.	Every 2 hours			Yes
	Massillon to Dennison	37.9	Yellow Coaches	Justus Dover New Philadelphia	None	$1.35	No comp.	Every 2 hours			Yes
	Akron to Wadsworth	17.1	Whites	Copley Loyal Oak	Interurban car	35c.	35c.	5 trips daily			Yes
	Akron to Edinburg	26.5	Various types	Stow Kent Ravenna	Interurban car	75c.	Comp. only to Ravenna	2 trips daily			Yes
	Dover to New Philadelphia	3.0	Various types	Dover New Philadelphia	None	15c.	No comp.	Every 15 min.			Yes
	Barberton to Wadsworth	7.36	Various types	Norton Center	Interurban car	15c.	14c.	City schedule			Yes



British Columbia Rapid Transit Company has co-ordinated a de luxe bus line with an existing car line



Bus operations by Public Service have steadily expanded in southern New Jersey

of Minneapolis and St. Paul ranges from 13 to 14 m.p.h. On the three suburban de luxe lines the speed ranges from 14 to 18 m.p.h. These speeds compare with 9 m.p.h. on city and feeder service, and 10 m.p.h. on street cars.

The British Columbia Rapid Transit Company, Vancouver, B. C., a subsidiary of the British Columbia Electric Railway, operates two services, de luxe motor coach and express. The lines are confined to districts in which the railway operates and terminate at the same depots, thus co-ordinating and getting the maximum use from railway and coach equipment at peak hours.

Between Vancouver and New Westminster, the railway operates over three routes, the de luxe motor coaches paralleling one of these. A one-way fare of 25 cents is charged on the coaches, and a round-trip fare of 35 cents on the rail cars. There is about five minutes difference in the running time. The interurban cars operate a twenty-minute service, and the motor coach schedule calls for a fifteen-minute headway throughout most of the day. A second de luxe bus operation parallels an interurban railway line into the Fraser Valley for a distance of about 72 miles. The motor coach fares on this route are based on the rate of 4 cents per mile, whereas the railway fares are based on 3 cents per mile, excepting at points where there is competition, when the competitive rate is met.

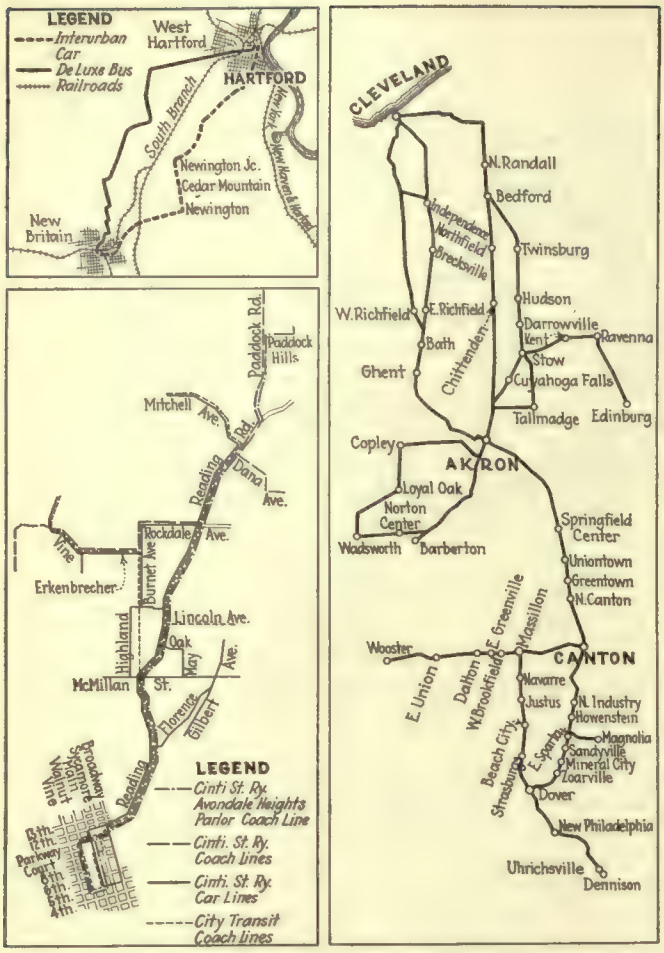
Eleven Fageols, two Whites, and one Federal sedan type bus, all fully equipped for de luxe service, are used on these lines. The motor coach service has proved satisfactory, and, from a financial standpoint, though the coaches take away some revenue from the railway, as a whole the earnings have increased. This is due to the fact that the motor coaches have eliminated strong competition by jitneys which gave a door-to-door service.

Intercity bus service carried on by the Connecticut Company in the state of Connecticut consists of seven lines. In the case of three of these lines, namely, Bridgeport-New Haven, Hartford-New Britain and Meriden-New Britain, the terminals are also connected by interurban car lines. The lines between Meriden and Wallingford, Norwich and Putnam, Meriden and Middletown, and Bridgeport and East Derby replaced trolley operations. In most instances where interurban cars and buses are operated, the cars cover a different or more circuitous route than the buses.

Between Bridgeport and New Haven a comparison of the two services is as follows: On the interurban cars the fare is 50 cents cash or five tokens at 8⅓ cents apiece; the running time is one hour and 45 minutes and a headway of 30 minutes is maintained. On the bus, the through fare is 60 cents cash and no local business is done in the city where street cars are paralleled, excepting between Stratford and Bridgeport, where the minimum fare is 20 cents as compared with 8⅓ cents

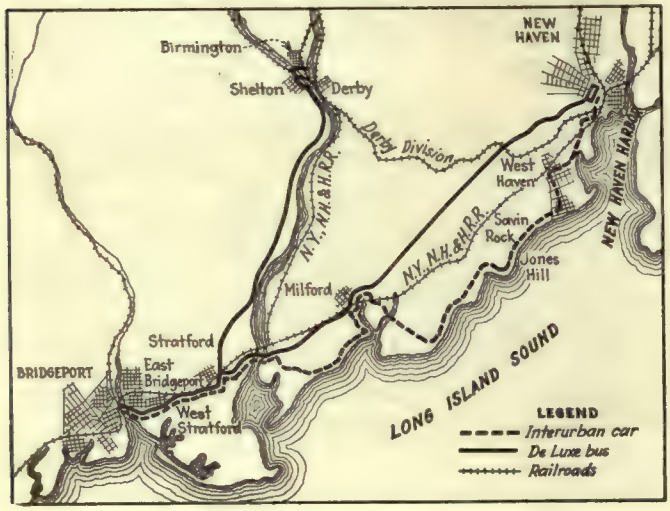


Union bus terminal is located in heart of Youngstown and serves all through lines



Upper left—Connecticut Company has car and bus services between Hartford and New Britain. Lower left—Superior type bus service is being operated by Cincinnati Street Railway to Avondale Heights. Right—Northern Ohio Power & Light Company operates de luxe buses over 383 miles of route

on the cars. The running time is 58 minutes and the headway is hourly. Between Meriden and New Britain, by way of Plainville and Southington, the interurban car runs on a headway of 30 minutes and consumes one hour and 17 minutes to make the trip, while the bus operates on a 40-minute headway with a running time of 38 minutes. The fare on these lines is the same, four tokens at 8⅓ cents each or four cash fares at 10 cents each. On the Hartford-New Britain line, the interurban car operates on a 30-minute headway during the non-rush hour and on a 20-minute headway during the rush hour, the fare being two tokens at 8⅓ cents each or 20 cents cash, while on the bus, the fare is 25 cents using tokens or 30 cents cash. The running time is 55 minutes and the headway is hourly.



De luxe buses use more direct route than interurban cars between New Haven and Bridgeport, Conn.

The Pennsylvania-Ohio Public Service Corporation and its subsidiary, the Pennsylvania-Ohio Coach Lines, began de luxe intercity bus service on Aug. 1, 1922, between Youngstown and Warren, Ohio. This original installation of bus service was made to eliminate a hack competition which was drawing patrons from the interurban car service between the two cities. On Nov. 1, 1922, a second line was inaugurated between Youngstown and Sharon, Pa. The hack competition continued to grow and additional bus lines were put in throughout the territory but by the latter part of 1923 the competition was eliminated and it was only necessary for the company to purchase two out of ten lines.

At the present time the Pennsylvania-Ohio Coach Lines operates over seven routes and operates bus terminals in Cleveland, Youngstown and Warren, Ohio. Two lines, namely, between Youngstown and Warren, and Youngstown and Sharon, Pa., are in direct competition with interurban car service. For the other lines competition consists of railroad service. On the New Castle, Pa., to Cleveland, Ohio, route, which operates by way of Youngstown, interurban car service is run between Youngstown and New Castle.

Co-ordination between the lines operated by the Pennsylvania-Ohio System and all connecting long distance lines operating through the state has been one of the chief factors in the success of the operation carried on by this company. After extensive preliminary work they have been successful in adjusting the schedules of their lines and connecting lines so that proper connections can be made at various points throughout the state. Likewise they have co-ordinated the sale of tickets or commutation mileage for use on other lines as well as their own. Commutation mileage books having a travel value of $10 and which are sold for $7.50 are handled by the Great Lakes Stages, Southwestern Bus Company and the Penn-Ohio Coach Lines, and are honored on practically all lines in the community. The mileage is redeemed by the company at the reduced value. Through-ticket sales for long hauls have been comparatively easy, but it has taken a great amount of effort to secure the many interline connections and joint tariffs with short routes which are now in existence. The results are indicated by the fact that one interline connection alone, involving a stub end of 15 miles, owned by an independent operator, gives and accepts from the Penn-Ohio lines as many as 1,400 passengers per month, all of whom are interline passengers. Another service rendered by this company is its direct connection between points on its line and the boats of the Detroit & Cleveland Navigation Company. Certain buses are run right to the docks of the company and through tickets will be sold for through travel by bus and boat in the near future.

Extensive merchandising of the various services by intercity buses is carried on by the company. Schedules are mailed by a group of bus operators to about 3,000 residents of the state. In addition to this approximately 1,200 schedules are mailed by the company to a group of people who previously received them and answered a letter asking about the effect of mailing such timetables and information. These 1,200 people requested

that the schedules continue to arrive at their homes. Every hotel in the state and most of the department stores receive schedules in bulk which are placed at convenient points for the use of their patrons.

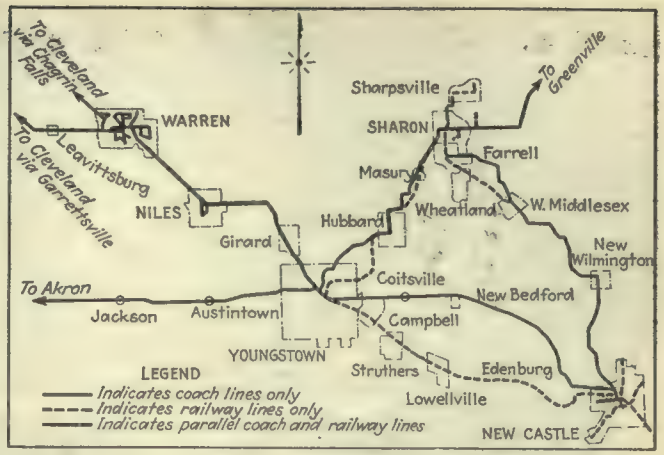
De luxe bus operation carried on by the Pacific Electric Railway, Los Angeles, Cal., consists of one line, known as the Beverly Boulevard Motor Coach Line, running between Los Angeles and Castellammare, a distance of approximately 23.8 miles. Castellammare is located on the coast, north of Santa Monica. This line serves a territory in which there is no other motor coach or street car service with the exception of a portion of the route within Los Angeles that is served by local lines of the Los Angeles Railway and Los Angeles Motor Coach Company. The line is restricted, however, in handling local traffic within the territory served by these other companies.

Twenty-nine passenger Yellow coaches equipped with individual, comfortably upholstered seats, are used on this route. Standees are not carried. Fares on the Beverly Boulevard Motor Coach Lines are on a slightly higher basis than on the other bus lines. The average one-way fare is 2.7 cents per mile, compared with the regular one-way fare basis of 2 cents per mile within a radius of 12½ miles from Los Angeles, and 2½ cents per mile outside of that zone.

The greater portion of the losses in the operation of this de luxe route is subsidized by a group of real estate operators owning extensive properties along the line. The line was established at their instance, approximately two years ago.

Through its subsidiary, the Shore Line Motor Coach Company, the Chicago, South Shore & South Bend Railroad operates a de luxe bus service between Chicago, Ill., and Benton Harbor, Mich., which is separated into two divisions, Chicago, Ill., to Michigan City, Ind., and Michigan City, Ind., to Benton Harbor, Mich. This route is 105 miles in length. The service operates through a territory just east of the Indiana-Illinois state line, which is also served with local street car operations. The equipment used on the de luxe service is of the parlor car type, whereas in the local operations the ordinary street car type of coach is used. The average speed on the de luxe route is 23⅓ miles per hour, whereas on the local routes the average is only 10 miles per hour.

The Eastern Massachusetts Street Railway, Boston, Mass., operates one de luxe bus line, between Taunton, Mass., and Providence, R. I., the operation in Providence being joint with the United Electric Railways Company of that city. These cities are also connected by an interurban car line. The fare on the interurban line is 60 cents one way or $1 for a round trip, while on the bus line the fare is 50 cents one way and 75 cents a round trip. The reduced rate on the buses is due to very severe jitney competition. The bus line does local business over its route, but the fare and territory served tend to make it an express operation.



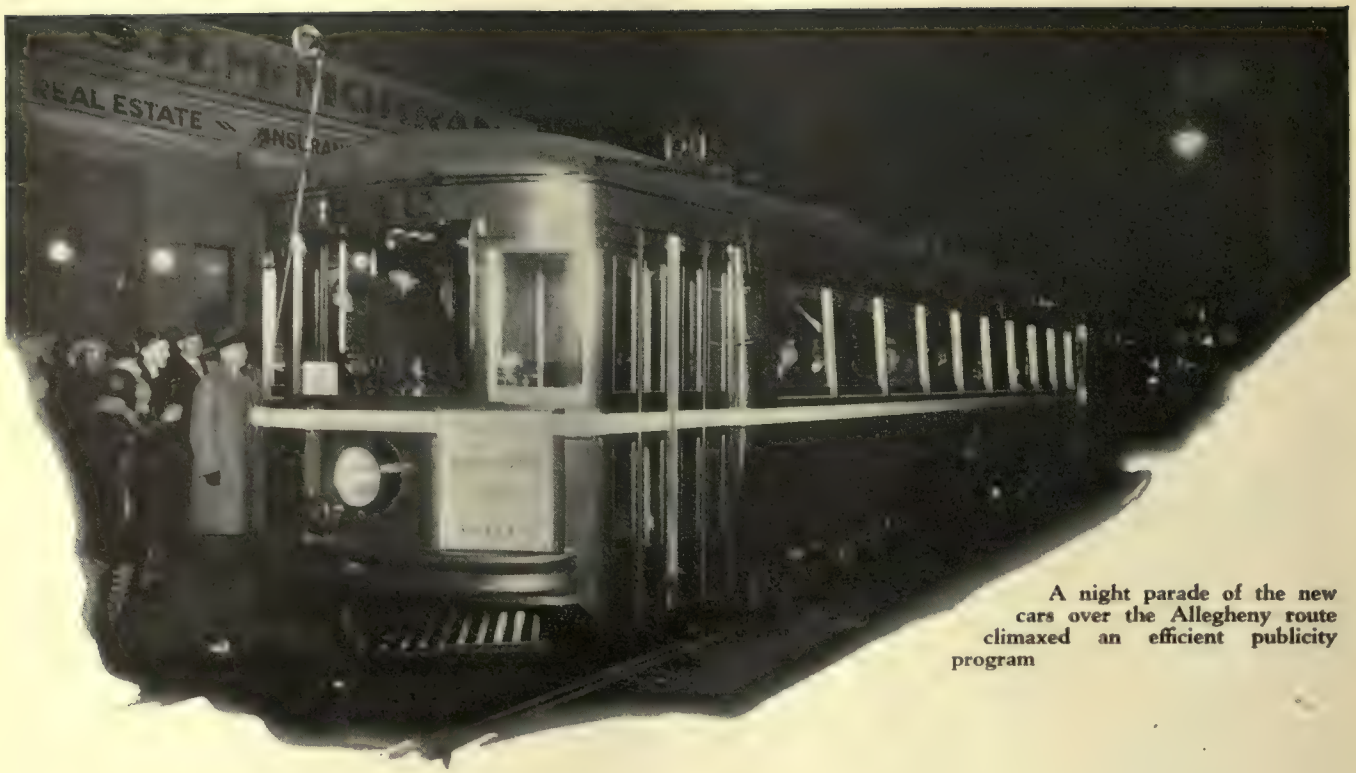
De luxe bus operations of Pennsylvania-Ohio System extend over wide area in the two states

The Northern Ohio Power & Light Company on twelve intercity de luxe bus routes operates 50 buses over a total of 383 miles. Between Akron and Cleveland there are four routes using four different roads. Service is also supplied between Cleveland and Akron by interurban cars operated by this company. Two other de luxe bus lines, namely, between Akron and Wadsworth, and Akron and Edinburg, have interurban car competition. On the remainder of the routes there is neither car nor other bus competition. An accompanying map shows the territory served by the Northern Ohio Power & Light Company and the table gives the details of these lines.

The Pacific Northwest Traction Company and the North Coast Transportation Company operate in a main trunk line from Portland, Ore., through Washington, to Vancouver, B. C. The latter company also operates several small branch lines. Although a very high type of equipment is used and a de luxe service rendered, this line is classed as express, rather than de luxe. No standees are permitted on any of the lines unless in a case of emergency. The schedule speed, including stopovers, is approximately 28 m.p.h. No regular stopping places are scheduled, but the buses stop on signal from intending passengers. The coaches do not average more than one stop every 3 or 4 miles.



Parlor bus route from Los Angeles helps build up shore resort at Castellammare



A night parade of the new cars over the Allegheny route climaxed an efficient publicity program

Complete Car Replacement

on Allegheny Valley Route

Twelve new cars have been placed in regular service following a three-day ceremony, including parade, public inspection and free riding

MODERNIZATION in practically every phase of operation was completed on the Allegheny Valley division of the West Penn Railways with the installation of twelve new cars on Feb. 14. An intensive and effective publicity campaign directed by the company and ably supported by the newspapers of the district laid the foundation for a three-day ceremony which included a parade of the new cars, public inspection of the cars in each town on the line and two hours of free riding.

This division, operated as the Allegheny Valley Street Railway, serves an industrial district lying on the west of the Allegheny River between Aspinwall and Natrona, Pa., with an extension across the river to New Kensington, Pa. The route is approximately



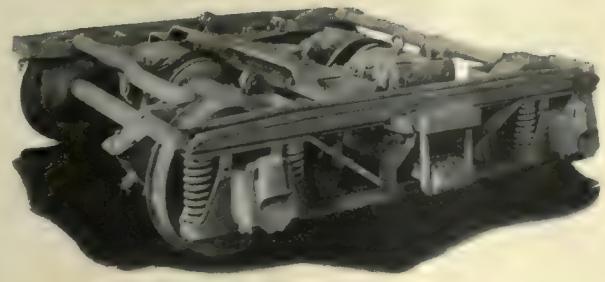
Each of the twelve new cars was christened in the town whose name it bore

20 miles long and is operated as two lines, one from Aspinwall to New Kensington and the other between New Kensington and Natrona. The fact that there are twelve towns on the route and twelve cars were needed to replace the old equipment led the company in their plan for the installation celebrations.

In order to bring forcefully before the residents of each town the completeness of the modernization program, each new car was named for one of the towns, with the name printed on the car above the number. One car was called "Miss New Kensington," one "Miss Aspinwall," etc. Representatives of the company went before the borough councils of the towns and laid before them the general plan for the installation ceremonies and asked their co-operation for its success. Each council was asked to select a young lady from the town to act as sponsor for the christening of the car bearing that town's name, the christening to take place during the parade to be held on the evening of Feb. 14. The selection of these sponsors in itself was one of the most effective bits of advertising that could have been done. In some cases the burgesses appointed the sponsor; in one town a contest was held and the sponsor chosen from among a number of contestants. Special street railway editions of two newspapers were printed and distributed throughout the whole section announcing the names of the sponsors and giving the details for the three-day celebration attending the inauguration of the new service.



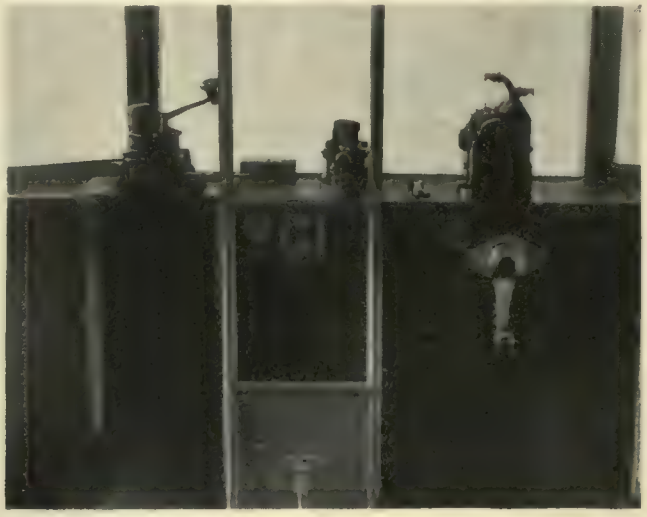
Comfort in every detail was a prime factor in the construction of the cars



The fundamental features of the trucks are cantilever elliptic springs and wing type journal box installation

As a result of this preliminary advertising the parade of the new cars was a pronounced success. At 7:30 on Friday evening, each car was spotted at a location within the town for which it was named in charge of a host, an official of the company, who received the guests that had been invited to make the first trip. The parade began in Natrona where two cars were spotted, the first carrying the West Penn Band. The second car, "Miss Natrona," was christened in the presence of approximately 500 residents of the town and the procession moved south along the route. As the leading car came to the location where another car was waiting, christening ceremonies were held and the new car fell in line and moved on with the rest. This procedure was carried out the whole way down the line until all cars were together in the Aspinwall loop.

During the ride, the guests, consisting of the town Councilmen and their families together with prominent citizens in each town, were entertained by the host who answered any questions about the new service. He gave them each a little booklet entitled "These Cars Are Yours," which explained some of the details of the new cars and told of the desire on the part of the West Penn Railways to give a modern service throughout their territory. Cigars and cigarettes were supplied to the gentlemen, while the ladies received candy and other favors. That the publicity had been effective was thoroughly demonstrated over the whole line of march. In every town the streets were lined with people and at the points where the cars were located, crowds gathered to watch the christenings. When the parade reached the southern end of the line, the formation was broken and each car proceeded back over the line alone, discharging passengers at points convenient to them. Because the regular service on the line was somewhat disrupted due to the parade, the intending passengers waiting along the line were picked up on the new cars and without charge were taken to their destination. On the next day, the cars were placed



Safety features and simplicity of control permitted the inauguration of one-man operation

at central locations in each town where they were open for inspection by the public. A representative of the company was in charge of each car during this time to answer any questions about the equipment or the new service. He also explained the safety devices and their adaptability to one-man operation, an innovation with the new cars. In every case the townspeople turned out in full force to inspect the new cars. On the following day, Sunday, between 2 and 4 p.m. the public was invited to ride free. Anyone boarding the cars between those two hours could make a trip at the company's expense and become familiar with the features of comfort and speed of the new cars.

The new cars were built by the Cincinnati Car Corporation, and were assembled at the West Penn shops in Connellsville, Pa. They are much lighter, faster and more comfortable than the old equipment. The length over all is 47 ft. 3 in.; width, 8 ft. 6½ in.; height, 10 ft. 3 in.; truck wheelbase, 5 ft. 4 in.; and the weight is approximately 31,000 lb. The truck is known as the Cincinnati Car Corporation's Type 101, the fundamental features of design being cantilever elliptic springs and wing type journal boxes. These have two coil springs per box, the box being movable vertically on rectangular slides which are held between the continuous tiebar underneath the boxes and the truck side frame by means of a through-bolt passing through the side frame, the rectangular slide and the bottom tiebar. Support of the motor by means of brackets attached to the truck side frame and a tube running across the truck from bracket to bracket is one of the features. Other specifications follow:

Air brakes	Westinghouse
Car signal system	Faraday
Curtain fixtures	National Lock Washer Company
Curtain material	Pantasote No. 86 M
Door mechanism	National Pneumatic C 10980
Doors	Folding
Floor covering	⅛-in. battleship linoleum
Glass	Plate
Hand brakes	Straight staff
Heat insulating mat rial	1-in. compressed cork
Heaters	Single coil panel type, Consolidated Car Heating Company
Headlights	Ohio Brass S.O.S. stationary type
Headlining	¼-in. Agasote
Journal bearings	Plain 3¼x7½ in.
Journal boxes	3¼x7-in. pedestal type
Motors	4 Westinghouse No. 1425-A, inside hung
Registers	Ohmer
Roof type	Arch
Roof material	No. 8 canvas
Seats	Reversible type cross-seats, 37-in. long
Seat spacing	32-in.
Seating material	Brown Spanish leather
Steps	Stationary
Trolley	Retrievers, Earl No. 4
Trolley base	West Penn standard
Trucks	Cincinnati Type 101
Ventilators	Ten Nichols-Lintern
Wheels	Rolled steel 22-in. diameter.

Accident Causes Analyzed at Cleveland

INSTRUCTIVE information concerning the cause of accidents on the Cleveland Railway has been developed by an investigation made by the company in collaboration with the Metropolitan Life Insurance Company. The data are based on an intensive study extending over a period of months and embracing the records of 167 motormen at the Woodhill station. To determine which operators were particularly prone to accident, the 1928 record of each motorman at the station was carefully studied. Accidents from all causes were included in determining an individual record so that all contributing factors might be given consideration.

It developed that there was a definite relationship between accident frequency and the length of service of the motormen, the veteran men in general having fewer accidents than the new men. It was shown that the motormen with unsatisfactory accident records were also inclined to use an excessive amount of power when operating their cars. No relationship was found to exist between accident frequency and delinquencies in reporting for work, tardiness, absence, etc.

Physical difficulties, such as defective vision, organic diseases, high blood pressure, etc., were found to be primarily responsible for about 12 per cent of the accidents. In 22 per cent of the cases an improper attitude of mind, or a personality unsuited to the work, was found to be a primary factor. The remaining 66 per cent were attributable to shortcomings such as failure to recognize potential hazards, inattention to work, etc.

"Dark Period" Before Sunrise Creates Accident Hazard

EXISTENCE of an accident hazard not generally recognized is indicated by investigations made recently by the Capital Traction Company, Washington, D. C., under the direction of H. V. Schreiber, safety engineer. These investigations were directed toward ascertaining conditions which exist during the "dark period" after the street lights have been extinguished and before sunrise. Because the company has a considerable number of vehicles in operation on the streets during the early morning hours, this study is of particular interest to the railway, but it was extended to include also the general collision hazard.

In Washington, as in most cities, the street lights are operated on the 4,000-hour schedule. This is roughly equivalent to lighting the lamps one half-hour after sunset and extinguishing them one half-hour before sunrise. An interesting exception to the usual practice in this regard is found in St. Louis where astronomical clock control is used to turn on the lights automatically at sunset and turn them off at sunrise.

Data furnished by the Weather Bureau in Washington show that a large proportion of days are cloudy, foggy, or rainy at sunrise. During the three years from Oct. 25, 1926, to Oct. 24, 1929, there were on the average 5.1 days per month when the weather was rainy, 12.9 days when the weather was cloudy, and 12.7 days when the visibility was poor for one reason or another. Monthly averages are given in the following table:

Three-Year Average of Weather Conditions at Sunrise

Month	Rainy Days	Cloudy Days	Poor Visibility Days
January	7.0	14.3	19.0
February	8.0	10.0	16.3
March	7.0	12.7	11.5
April	3.7	12.6	8.1
May	4.7	16.3	11.4
June	3.0	14.3	5.9
July	2.0	16.3	6.6
August	1.7	21.3	9.8
September	3.7	15.0	12.2
October	6.3	10.4	16.3
November	6.0	16.7	16.8
December	8.3	13.7	18.6
Average	5.1	12.9	12.7

These figures were further classified by the Weather Bureau to show the approximate distance at which objects could be distinguished on foggy mornings.

Average Visibility Distance on Foggy Days

Month	50 M	200 M	500 M	1,000 M	2,000 M	Total
January	0.9	1.0	3.8	5.2	8.1	19.0
February	0.1	0.6	3.5	5.2	6.9	16.3
March	0.2	0.3	0.3	3.6	7.1	11.5
April	...	0.1	1.1	1.7	5.2	8.1
May	...	...	1.9	1.4	8.1	11.4
June	...	...	0.8	2.0	3.1	5.9
July	...	...	0.5	1.8	4.3	6.6
August	0.1	0.1	1.4	2.0	6.2	9.8
September	0.3	0.1	1.4	3.6	6.8	12.2
October	0.4	0.4	2.5	4.0	9.0	16.3
November	0.1	0.2	3.4	4.9	8.2	16.8
December	0.8	0.5	1.9	6.0	9.4	18.6

As to the actual occurrence of accidents during this period of the day, complete data are not available. The company's records, however, show some twenty collisions which occurred during the dark period in a year's time. Also the company had one negro track greaser killed by an automobile while he was at work. Records of the Traffic Bureau covering a period from January, 1926, to September, 1929, show 167 accidents during these hours.

Four-Year Accident Record for Dark Period

Month	Time A.M.	Accidents: Fatal	Accidents: Non-fatal
January	6:30–7:30	3	28
February	5:30–6:30	1	13
March	5:30–6:30	0	11
April	4:30–5:30	0	11
May	4:30–5:30	0	4
June	3:30–4:30	0	11
July	4:30–5:30	0	9
August	4:30–5:30	1	9
September	5:30–6:30	0	8
October*	5:30–6:30	2	13
November*	5:30–6:30	2	10
December*	6:30–7:30	2	29
Total		11	156

*Three years only.

From these figures the conclusion is reached that the prevention of accidents during this "dark period" justifies the extension of the lighting schedule in order to protect properly all users of the streets on cloudy, foggy and rainy days.

LETTER TO THE EDITOR

Statistics on Pittsburgh Railways Securities Amplified

INFORMATION on the Pittsburgh bonds published in the Annual Statistical Number was based on compilations by well-known financial authorities, supplemented by statements sent directly to the editors. The omissions of disposition of the Pittsburgh securities in Table III was made because correct information was not obtainable up to the time of going to press. The statement of defaults of interest is similar to that published in the Annual Statistical Number of the JOURNAL for Jan. 12, 1929, and the same bonds are included in the earlier list. Where the maturity date is given in the table of bonds in default it is assumed that both principal and interest remain unpaid. In the present instance the interest is being met, although bonds are in default of principal.

The JOURNAL is glad to have this information and to publish it as an addition and correction to that given in the article referred to.—EDITORS.

Pittsburgh Railways Company

PITTSBURGH, PA., Jan. 31, 1930.

To the Editor:

Our attention has been called to an article on page 44 of ELECTRIC RAILWAY JOURNAL for January, in which we find a number of incomplete statements with respect to matured bonds on the properties operated by the Pittsburgh Railways Company:

TABLE III—DISPOSITION OF ELECTRIC RAILWAY MATURITIES IN 1929

The $200,000 of Pittsburgh Railway equipment trust, due Feb. 1, 1929, were retired.

The Central Traction Company firsts, due July 1, 1929, in the amount of $325,500 have not been extended. The principal is in default, but interest is being paid each six months at the rate of 5 per cent per annum.

The Wilkinsburg & East Pittsburgh Street Railway firsts, due Sept. 1, 1929, in the amount of $1,989,000 were refunded by an issue of Monongahela Street Railway first refunding mortgage 5 per cent bonds, due Dec. 1, 1958.

TABLE VIII—OUTSTANDING ELECTRIC RAILWAY BONDS IN DEFAULT OF INTEREST

Included in this table are the following issues of mature bonds of the Pittsburgh Railway system which are in default with respect to the payment of principal, but upon which interest has been and is being paid in full, semi-annually:

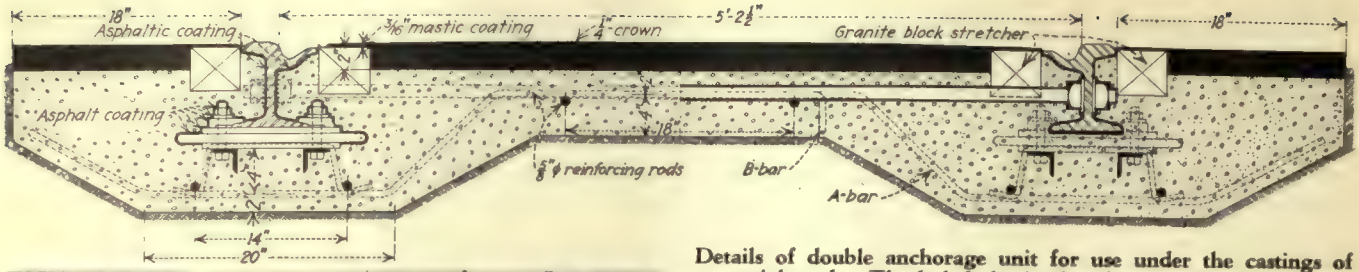
	Amount	Matured
Bloomfield Street Railway 5's	$250,000	Aug. 1, 1923
Brownsville Avenue Street Railway 5's	300,000	Aug. 1, 1926
Centra Passenger Railway 6's	125,000	Oct. 1, 1924
Citizens Traction Company 5's	246,000	Oct. 1, 1927
Millval., Etna & Sharpsburg Street Railway 5's	741,000	Nov. 1, 1923
Penn Street Railway 5's	250,000	Dec. 1, 1922
Pittsburgh, Crafton & Mansfield Street Railway 5's	164,000	July 1, 1924
Pittsburgh Traction Company 5's	666,000	Oct. 1, 1927
Pittsburgh & West End Passenger Railway 5's	303,000	July 1, 1922
Washington Electric Street Railway 5's	125,000	Feb. 1, 1927

There is also included in this table $993,000 principal amount of Monongahela Street Railway 5's which mature June 1, 1898, and were refunded by a similar amount of first refunding mortgage 5 per cent bonds of that company, due Dec. 1, 1958; also, $1,989,000 principal amount of Wilkinsburg & East Pittsburgh Street Railway 5's, due Sept. 1, 1929, which were refunded by the issue of a similar amount of Monongahela Street Railway first refunding mortgage 5 per cent bonds, due Dec. 1, 1958.

The $1,500,000 principal amount of Pittsburgh & Birmingham Traction 5's due Nov. 1, 1929, were extended, at the same rate of interest, to Nov. 1, 1930.

As the interest on all outstanding matured and unmatured bonds of the Pittsburgh Railway System has been and is being paid, when due, we would thank you to publish in the next issue of the ELECTRIC RAILWAY JOURNAL, a statement correcting the erroneous statements published in the January issue with respect to the bond issues indicated above.

C. S. MITCHELL.
Controller.



Details of double anchorage unit for use under the castings of special work. The bolt holes in the plate are slotted to permit fastening to variable width special work castings



Completed section of tieless track laid in New Orleans. Steel reinforcement is in place and ready for pouring of concrete

TRACK

By

I. O. Mall

Assistant Superintendent of Roadway
New Orleans Public Service, Inc.

ENGINEERS of the New Orleans Public Service are of the opinion that the design of paved track is susceptible of rational analysis and that a paved track to be economically satisfactory must combine the materials of construction in the most scientific manner. With this thought in mind the matter was approached as an original problem in engineering design and a design was developed differing radically from ordinary practice. The track structure consists primarily of a reinforced concrete foundation to which the rails are anchored in parallel surface and alignment by means of resilient rail anchorages.

Due to the commercial considerations involved in the manufacture of steel rails, the existing A.E.R.E.A. standard 7-in. girder rail was chosen for use and the track structure developed around this rail. Analysis determined the requirements of the rail anchorage, and since a unit was not available on the market, a new design was developed. The resilient rail anchorage utilized in this construction was subjected to detail development tests and its dimensions and properties proportioned to meet service conditions.

The foundation is shaped so as to form a continuous girder beneath each rail. The reinforcement consists of $\frac{5}{8}$-in. straight and deformed bars placed both longitudinally and transversely at points where they will efficiently resist the stresses set up in the foundation. Just beneath and parallel to each rail are two continuous longitudinal angles embedded in the concrete to which are fastened the rail anchorage units. These angles are held in parallel alignment by deformed straps welded to the angles at the points of contact. These same deformed straps support and carry the entire system of bar reinforcement.

The resilient rail anchorage consists of two oval-shaped thin steel plates crimped on the outer edges over a round steel ring and welded at the periphery to form a closed container. This weld fuses the edges of the plates together and the whole is fused to the steel ring, forming a very stable marginal periphery within the diaphragm. An oval-shaped bearing plate is welded to both the top and bottom diaphragm plates. These bearing plates are substantially smaller than the diaphragm plates and concentric therewith. The rail is held in place by rail clips, the anchorage bolts passing through the diaphragm and bearing against the embedded angles in the foundation. The inside of the diaphragm contains an asphalt-asbestos mixture forced into place under pressure and while hot.

The load from the rail is transmitted through the upper bearing plate to the top of the diaphragm. As the diaphragm plate flexes inward a compression is built up in the confined asphalt-asbestos cushion and this pressure is reacted to by the bottom bearing plate of the diaphragm which in turn transmits the load to the foundation. When the load is relieved the residual compression in the cushion acting in conjunction with the resilient diaphragm plates returns the upper bearing plate to its normal position. The asphalt-asbestos cushion serves a dual purpose in that it affords stability to the diaphragm and aids in dissipating the vibration absorbed from the rail.

The resilient rail anchorages are spaced on 4-ft. centers and staggered with respect to parallel rails, this latter feature minimizing the foundation stresses. The steel bar reinforcement in the foundation is so distrib-

Design adopted after prolonged experimentation has little resemblance to usual types. Reinforced concrete foundation acts as unit to hold rails in position. First cost is $75,000 per mile. Maintenance cost is estimated at less than $100 per mile per year

Without TIES

Built at New Orleans



After the trench is graded, precast concrete pedestals are placed in position. The steel framework, made up in 20-ft. sections with anchorages attached, is then placed in position over the pedestals

uted as to absorb the live-load and temperature stresses developed in street service.

The reinforced concrete foundation acts as a unit to hold the rails in parallel surface and alignment and in this capacity displaces the conventional crosstie used in track construction.

Rails are maintained independent of the pavement by being coated with approximately ¼ in. of plastic asphaltic mixture. This material maintains its normal plastic condition under the maximum and minimum temperatures that are met. This coating functions as a vibration insulator and prevents water from entering between the pavement and the rail. An Elastite strip ¼ in. in thickness is placed under the base of the rail and held in place by special wire clamps. Thus the foundation and pavement concrete is not allowed to come into bonding contact with the rail and sufficient leeway is provided for the resilient action of the rails.

Basic advantages of this type of track construction are believed to be:

1. Proper recognition of the dynamic action produced in the rail by the progressive movement of a rolling wheel load.

A moving wheel load is essentially a moving impact load. The entire wheel load is concentrated on a narrow line area on the surface of the rail. If the rail cannot give slightly and ease the shock of the suddenly applied load the intense local stress developed in the surface structure of the rail approaches and sometimes exceeds the bearing strength of the steel. As a consequence the rail wears away rapidly, due not so much to abrasion as to the peening action of rolling.

If, however, the rail can give or deflect slightly with a resilient reaction, the impact stress is distributed over the cross-sectional area of the rail body with a lessened intensity of local stress. Commercial steel rails are of a beam section which gives them stiffness and a resilient capacity when acting as a beam. Due to the stiffness of the rail the deflection wave tendency extends a considerable distance on either side of the wheel loads. In order to permit elastic reaction in the rail, sufficient resiliency is provided in the rail anchor-



Rails in position with the anchorages attached and clips tightened. Wooden wedge blocks are used on top of pedestals to obtain surface grade adjustment



The rail is coated with about ¼ in. of plastic asphalt material applied with a paddle as shown

ages to allow the deflection wave to spread out and proceed uniformly.

The effect of resilient rail action within controlled limits on rail life is of course problematical. Experience in New Orleans with approximately 100 miles of ballasted track without pavement, which is flexible rather than resilient, indicates that rail failure will result from fatigue rather than from abrasive and rolling wear. It seems logical to conclude that rail life under a given tonnage movement will be very materially increased over that obtained in the past with rigid rail construction.

2. Rail anchorage has durable resilient properties and allows resilient movement without mechanical wear.

The resiliency of the rail anchorage is dependent upon the flexing action of the diaphragm plates. The diaphragm is designed so that a load of 10,000 lb. causes it to deflect 0.025 in. Thus the banding stresses set up in the plates are very small and the plates should have a long fatigue life. The asphalt-asbestos cushion is inert and confined so that it cannot be dissipated. Properly protected from corrosion and electrolysis the life expectancy of the anchorage is certainly commensurate with the rest of the structure.

Firm anchorage to the foundation in conjunction with resiliency in the rail support is provided by extending the anchorage bolts through the reinforcing angles in the foundation. Repeated impact tests over a long period of time show that vibrations set up in the rail are absorbed by the diaphragm and this destructive action is eliminated before it reaches the pavement.

It has been thoroughly demonstrated in industrial practice that surfaces in variable pressure contact with bolts are most effectively held tight when a resilient element is incorporated at the plane of surface contact. This element of design is provided in the diaphragm. It is important to note also that movement in the rail anchorage occurs without attendant mechanical wear, a factor which assures uniform action throughout its life. Attention is also called to the action of the diaphragm which permits a lateral or tipping action of the rail. This allows the rail and wheel to make full contact under variable conditions of wear and improves the adhesion characteristics between the wheel and the rail.

3. Rail action is maintained independent of and not constrained by the surrounding pavement with a water-tight seal between the rail and the pavement.

With a uniformly controlled rail movement it becomes possible to separate the rail and the pavement with an assurance of maintaining water-tight construction. The sealing material between the rail and the pavement breaks the line of vibration and materially reduces and deadens the operating noises. The asphalt is impervious to water and is protected from atmospheric reactions which might cause it to deteriorate.

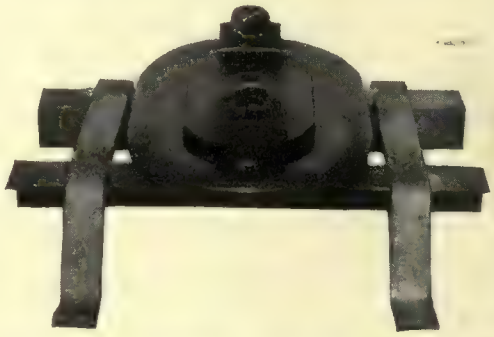
4. Design provides for unlike strength and elastic properties of rails and concrete foundation in resisting the effect of expansion and contraction due to temperature change.

Under the influence of temperature change the rail acts independently of the foundation. Expansion builds up a compressive stress in the rail. The rail fastenings hold the rail to alignment and prevent buckling, and the compressive stress is absorbed in the rail. Contraction builds up a tension in the rail which requires no assistance from the fastenings in holding the rail to alignment.

Expansion and contraction of the reinforced concrete



Pneumatic hammers with block tool points were used to drive the concrete thoroughly to place in the foundation



Single rail anchorage unit for use under curve rails

foundation occur independently of the rails in accordance with the elastic properties of the unit. Steel and concrete have the same coefficient of expansion, but due to their unlike strength and elastic properties they cannot act together under the influence of temperature change. Steel rails have sufficient strength to resist the range of temperatures encountered in service. Concrete does not have sufficient strength to resist the range of temperatures encountered, the failure being due to contraction with attendant cracking. Sufficient steel bar reinforcement to prevent and control visible cracking has been utilized in this design to provide for flexural load stresses acting in conjunction with temperature stresses.

5. The foundation and base pavement are made integral and the reinforced unit precludes the use of a conventional crosstie member.

Integral construction of the foundation and pavement concrete into a monolithic mass provides maximum strength with a minimum of material. The introduction of steel bar reinforcement controls and stabilizes the concrete which is in accordance with the fundamental requirements of a

properly designed concrete structure. Sufficient time has not elapsed in the industrial world to prove the life expectancy of reinforced concrete but it can logically be expected to have a life far greater than concrete without reinforcement.

As long as the concrete maintains its homogeneous stability the rails will be held in parallel surface and alignment. The conventional crosstie, when embedded in concrete, functions only as an anchorage for holding the rails. In this design the steel which would commonly be utilized as a direct member between the rails has been incorporated as bar reinforcement in the concrete foundation and the crosstie eliminated.

Tie rods are used at sufficient intervals between the rails to hold them in a parallel position and to facilitate proper alignment during construction. They are covered with asphaltic material to prevent their bonding to the concrete, which in turn prevents their interfering with the resilient action of the rail.

6. Marginal stability of the pavement alongside the rails permits the use of an asphalt surface pavement.

The granite paving block laid parallel to the rail and embedded in the green concrete provides lateral stability for the edges of the asphalt pavement. An asphalt pavement protected in this manner can develop its full life without destruction. The surface pavement is renewable without disturbance to the rest of the structure. The cushioning of the traffic wheel load inherently gained with asphalt pavement adds materially to the life expectancy of the concrete foundation.

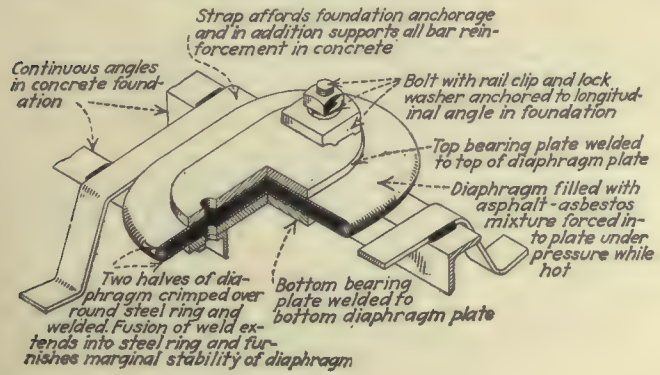
7. Design provides for renewal of rail with minimum disturbance of surface pavement and no disturbance at all to the foundation.

The rail may be removed by breaking out the granite block and sufficient concrete between the block and the rail to allow access to the clip fastenings. On the assumption that the resilient rail will fail ultimately, its replacement can be made without disturbing the foundation.

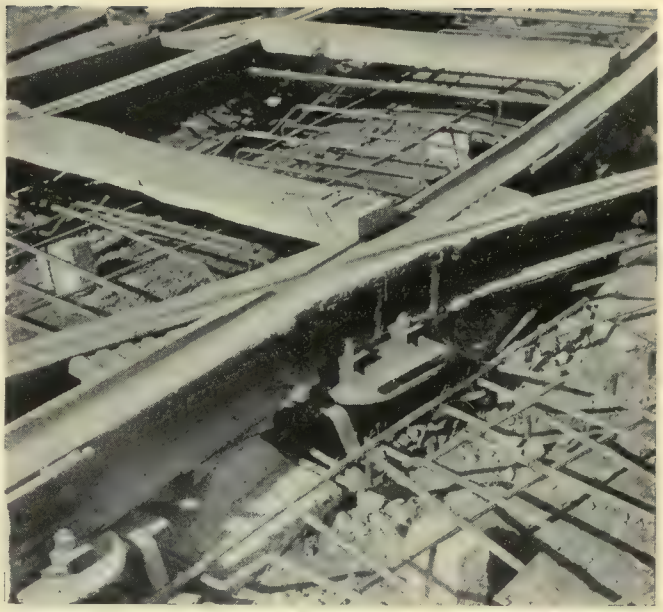
8. First cost of this type of construction is high, but this is offset by the reduced cost of maintenance and the longer life.

It is obvious that this design is not a cheap construction. Comparison with rigidly constructed track utilizing steel crossties shows that the differential cost factor between the two is based upon rail anchorage cost. Manufacture of the resilient rail anchorages on a production basis has potential possibilities of balancing the cost of steel in the two units of construction. The track constructed on the project as outlined in this article cost $75,000 per mile.

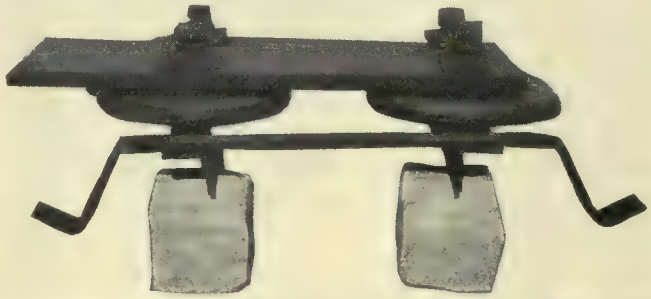
Analysis of the maintenance requirements of this design indicates that there should be practically no maintenance at all. In fact, an underlying motive in the development of the design was to construct a track that would require no major maintenance. If the structure holds up as it should and as has been proved by concentrated tests, track maintenance will be confined to welding and grinding at the joints and to repairs of the asphalt pavement occasioned by vehicular traffic.



Details of resilient rail anchorage



New design of track being tried in New Orleans differs from customary practice in that no ties are used



Application of double anchorage unit under silico-manganese frog. Clips are adjusted to fit the base of the casting and then welded to base plate and to frog casting

While it is desirable from the investment point of view to keep the first cost as low as possible, this should not be done at the expense of subsequent maintenance and depreciation. Longer life with reduced maintenance justifies a higher first cost. Our analysis indicates an average maintenance cost not exceeding $100 per mile per year throughout its full life, and a depreciation rate of not greater than 3 per cent to cover renewals and replacements.

This design of track has been used in the reconstruction of Canal Street at New Orleans in which four parallel tracks occupy the center of the street in a raised neutral strip 56 ft. wide. This strip is paralleled by 35-ft. roadways on either side. The construction involves approximately 4 miles of tangent track interlaced with 32 special work layouts. Three-fourths of the special work layouts and over one-half of the tangent tracks were constructed under car operation.

Single Life vs. Renewable Track

Opinions of prominent way engineers on this interesting subject will be presented in the April issue

Monthly and Other Financial Reports

Gains in Gross and Net Income Seen in January on Numerous Properties Over Last Year

		Operating Revenue	Operating Expenses	Taxes	Gross Income	Net Income
		$	$	$	$	$
Market Street Railway, San Francisco, Cal.						
January, 1930		781,528	674,048a		107,480	51,347
January, 1929		789,713	688,090a		101,623	41,944
12 mo. end. Jan., 1930		9,582,008	8,029,052a		1,552,956	846,916
12 mo. end. Jan., 1929		9,736,269	8,323,864a		1,413,405	673,789
Capital Traction Co., Washington, D. C.						
December, 1929		377,088	259,420	23,894	99,168	67,240
December, 1928		375,666	260,989	30,038	89,835	57,339
Jacksonville Traction Co., Jacksonville, Fla.						
December, 1929		101,549	76,474	8,075	16,393	
December, 1928		104,290	84,260	5,775	13,601	
12 mo. end. Dec., 1929		1,141,139	928,589	108,890	97,533	*60,421*
12 mo. end. Dec., 1928		1,199,516	971,149	106,774	115,154	*48,864*
United Railways & Electric Co., Baltimore, Md.						
December, 1929		1,470,831	972,529	152,554	362,263	80,723
December, 1928		1,431,039	968,459	129,156	350,009	65,879
12 mo. end. Dec., 1929		16,717,099	11,335,024	1,635,733	3,921,934	534,856
12 mo. end. Dec., 1928		16,273,806	10,873,921	1,578,782	3,971,926	558,393
Boston Elevated Railway, Boston, Mass.						
December, 1929		3,105,111	2,030,450	100,801	978,710	286,824
December, 1928		3,153,656	2,085,649	145,689	926,655	225,043
Boston, Revere Beach & Lynn R.R., Boston, Mass.						
3 mo. end. Dec., 1929		285,865	253,617	3,692	29,446	*7,281*
3 mo. end. Dec., 1928		281,658	265,439	9,146	6,936	*5,371*
12 mo. end. Dec., 1929		1,271,014	1,002,418	33,769	237,681	90,520
12 mo. end. Dec., 1928		1,222,093	1,068,548	43,896	112,591	61,894
Eastern Massachusetts Street Railway, Boston, Mass.						
January, 1930		758,812	448,284	37,755	282,360	82,456
January, 1929		796,402	491,090	35,716	286,830	80,691
Springfield Street Railway, Springfield, Mass.						
3 mo. end. Dec., 1929					135,922	64,226
3 mo. end. Dec., 1928					173,971	101,187
12 mo. end. Dec., 1929					499,387	209,046
12 mo. end. Dec., 1928					567,019	282,102
Worcester Consolidated Street Railway, Worcester, Mass.						
3 mo. end. Dec., 1929					158,996	49,244
3 mo. end. Dec., 1928					188,205	65,924
12 mo. end. Dec., 1929					639,015	184,050
12 mo. end. Dec., 1928					620,314	150,036
Department of Street Railways, Detroit, Mich.						
January, 1930		2,165,113	1,810,502	65,090	297,796	149,123
January, 1929		2,400,419	1,961,002	62,545	398,509	270,456
12 mo. end. Jan., 1930		26,209,568	20,907,042	753,494	4,654,066	2,981,856
12 mo. end. Jan., 1929		24,969,027	19,576,192	778,592	4,861,680	2,978,992
Duluth-Superior Traction Co., Duluth, Minn.						
12 mo. end. Dec., 1929		1,780,428	1,476,499	140,770	181,739	12,756
12 mo. end. Dec., 1928		1,873,330	1,535,170	153,562	218,394	49,222
Kansas City Public Service Co., Kansas City, Mo.						
December, 1929		771,361	624,081	43,361	103,918	28,072
January, 1930		761,935	603,911	41,675	116,348	41,741
12 mo. end. Dec., 1929		8,951,616	6,825,216	501,786	1,624,612	698,223
Illinois Terminal Co., St. Louis, Mo.						
December, 1929		586,313	363,381	29,262	193,670	145,491*f*
December, 1928		573,945	588,692	22,495	*37,252*	*97,426f*
12 mo. end. Dec., 1929		7,163,425	5,015,064	264,072	1,884,156	1,384,966*f*
12 mo. end. Dec., 1928		6,717,136	5,101,080	305,320	1,310,648	868,179*f*
Lincoln Traction Co., Lincoln, Neb.						
12 mo. end. Dec., 1929		475,318	415,788a		60,614	12,419
12 mo. end. Dec., 1928		480,033	389,714a		91,889	31,066
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.						
December, 1929		95,637	65,196	*8,384e*	45,823	13,795
December, 1928		89,769	67,772	*6,146e*	37,855	4,610
12 mo. end. Dec., 1929		1,025,933	760,871	70,775	317,053	*64,077*
12 mo. end. Dec., 1928		1,036,155	749,352	75,963	312,545	*70,240*
Brooklyn-Manhattan Transit Corporation, New York, N. Y.						
January, 1930*d*		5,134,097	3,383,385	353,454	1,492,346	715,528
January, 1929		3,977,564	2,595,745	288,281	1,149,078	439,808
7 mo. end. Jan., 1930*d*		35,544,051	23,805,477	2,253,662	10,001,305	4,566,659
7 mo. end. Jan., 1929		28,112,915	18,306,475	1,941,116	8,412,423	3,545,950
Brooklyn & Queens Transit Corporation, New York, N. Y.						
January, 1930		1,971,577	1,550,153	117,113	325,940	191,390
January, 1929		1,962,740	1,687,814	104,381	191,155	63,791
7 mo. end. Jan., 1930		13,907,132	10,969,673	800,103	2,287,688	1,403,534
7 mo. end. Jan., 1929		14,071,065	11,729,520	748,730	1,743,678	842,757
Fifth Avenue Coach Co., New York, N. Y.						
September, 1929		556,691	450,950a		132,539	131,926
September, 1928		559,065	474,352a		105,103	102,838
3 mo. end. Sept., 1929		1,674,774	1,414,154a		332,555	330,718
3 mo. end. Sept., 1928		1,735,911	1,466,949a		326,723	319,254
Hudson & Manhattan R.R., New York, N. Y.						
January, 1930		1,087,684	552,211a		535,473	200,855
January, 1929		1,060,890	545,945a		514,945	179,428
Long Island Railroad, New York, N. Y.						
December, 1929		3,110,384	2,410,946	133,390	557,998	418,569*f*
December, 1928		3,128,417	2,407,285	128,258	592,514	422,613*f*
12 mo. end. Dec.,	1929	41,326,194	27,734,679	2,922,226	10,649,328	8,707,943*f*
12 mo. end. Dec.,	1928	40,532,572	28,434,357	2,688,837	9,390,508	7,542,458*f*
New York, Westchester & Boston Ry., New York, N. Y.						
December, 1929		216,830	142,343	26,437	49,108	*249,249*
December, 1928		204,911	153,697	19,947	32,544	*184,190*
12 mo. end. Dec.,	1929	2,530,488	1,570,218	275,817	696,912	*1,970,935*
12 mo. end. Dec.,	1928	2,390,398	1,622,858	239,672	540,522	*1,908,438*
Staten Island Rapid Transit Co., New York, N. Y.						
December, 1929		196,274	90,670	18,448	87,156	77,226*f*
December, 1928		242,433	164,611	17,166	60,656	22,715*f*
12 mo. end. Dec.,	1929	2,637,897	1,892,347	210,265	535,285	460,515*f*
12 mo. end. Dec.,	1928	3,127,661	2,103,175	225,874	798,612	349,650*f*
Third Avenue Railway, New York, N. Y.						
January, 1930		1,254,726	982,045	90,508	201,424	*43,648*
January, 1929		1,259,493	1,006,301	86,647	184,410	*89,211*
7 mo. end. Jan.,	1930	8,926,444	6,894,688	624,850	1,545,597	*253,852*
7 mo. end. Jan.,	1929	9,050,681	7,005,433	642,216	1,535,670	*338,583*
Schenectady Railway, Schenectady, N. Y.						
3 mo. end. Dec.,	1929	417,999	376,179	22,307	20,613	*44,102*
3 mo. end. Dec.,	1928	429,636	357,955	23,330	48,519	*9,478*
York Railways, York, Pa.						
12 mo. end. Dec.,	1929	2,841,235			1,298,216	769,987
12 mo. end. Dec.,	1928	2,688,422			1,254,644	724,511
Galveston-Houston Electric Railway, Houston, Texas						
December, 1929		42,559	24,816	3,644	14,097	
December, 1928		50,088	28,053	2,493	19,539	
12 mo. end. Dec.,	1929	584,490	329,020	32,356	223,306	*46,654*
12 mo. end. Dec.,	1928	643,800	373,360	31,768	238,671	*31,138*
Houston Electric Co., Houston, Texas						
December, 1929		286,365	175,540	6,379	104,445	
December, 1928		289,477	183,722	16,922	88,831	
12 mo. end. Dec.,	1929	3,375,857	2,085,804	273,926	1,027,859	629,190
12 mo. end. Dec.,	1928	3,343,294	2,059,957	291,672	991,664	580,963
Memphis Street Railway, Memphis, Tenn.						
November, 1929		241,964	154,206a		87,761	43,343
November, 1928		242,444	160,848a		83,660	40,439
12 mo. end. Nov.,	1929	2,918,268	2,004,288a		914,896	387,920
12 mo. end. Nov.,	1928	2,926,468	1,945,590a		984,207	467,404
Pacific Northwest Traction Co., Seattle, Wash.						
December, 1929		84,961	49,642	2,896	32,421	
December, 1928		70,366	63,983	4,043	2,338	
12 mo. end. Dec.,	1929	964,072	717,375	54,176	192,518	76,303
12 mo. end. Dec.,	1928	881,076	736,776	51,644	92,654	*62,601*
Edmonton Radial Railway, Edmonton, Alta.						
November, 1929		72,647	45,842		27,304	1,956
November, 1928		59,656	44,492		25,161	3,418
11 mo. end. Nov.,	1929	763,602	494,664		268,887	9,528
11 mo. end. Nov.,	1928	726,278	485,301		242,977	802
Lethbridge Municipal Railway, Lethbridge, Alta.						
November, 1929		5,244	4,327		917	*1,669*
November, 1928						*2,218*
11 mo. end. Nov.,	1929	55,542	45,502		10,040	*18,400*
11 mo. end. Nov.,	1928					*24,824*
British Columbia Electric Railway, Vancouver, B. C.						
December, 1929		1,255,522	934,286a		321,236	
December, 1928		1,228,405	806,221a		422,184	
Regina Municipal Railway, Regina, Sask.						
December, 1929		47,970	27,323		20,647	8,854
December, 1928						10,075
12 mo. end. Dec.,	1929	431,407	262,254		169,153	27,632
12 mo. end. Dec.,	1928					10,293
Saskatoon Municipal Railway, Saskatoon, Sask.						
November, 1929		31,408	22,764	1,442	7,202	*2,313*
November, 1928						3,271
11 mo. end. Nov.,	1928	349,845	231,349	13,791	104,704	8,235
11 mo. end. Nov.,	1928					6,858
Havana Electric Railway, Havana, Cuba						
3 mo. end. Dec.,	1929	1,440,630	1,165,782a		283,594	123,136
3 mo. end. Dec.,	1928	1,350,936	1,116,879a		242,526	81,562
12 mo. end. Dec.,	1929	5,694,051	4,608,568a		1,116,940	473,580
12 mo. end. Dec.,	1928	5,415,175	4,494,473a		959,873	315,922

Italic figures indicate deficit. *a* Includes taxes. *b* Net operating revenue. *c* Before taxes. *d* Including Brooklyn & Queens Transit System. *e* Credit. *f* Net after rents.

Prizes Awarded for

First Period of New Maintenance Contest

Atlanta and Cleveland Railway men are winners in way and structures, rolling stock and shops, and bus departments. No award made in the electrical and line department.



James Davidson



W. H. Hayes

DURING the first quarter of the ELECTRIC RAILWAY JOURNAL Maintenance Contest started in November, 1929, a total of 23 maintenance items were submitted. Many properties not having participated in previous contests contributed valuable ideas. All items submitted were carefully considered by the committee of judges consisting of C. A. Smith, superintendent of roadway Georgia Power Company, chairman; G. C. Hecker, general secretary American Electric Railway Association; Dwight L. Smith, electrical engineer Chicago Rapid Transit Company; T. H. Nicholl, research department Cleveland Railway; and John A. Miller, Jr., managing editor of the JOURNAL.

In the department of rolling stock and shops, the prize was awarded to the article "Hood Rims and Carlins Reshaped by Machine," submitted by James Davidson, assistant foreman in the mechanical department of the Cleveland Railway. This machine is unusual in its design and greatly facilitates the forming of hood rims and carlins as described elsewhere in this issue. The prize in the department of way and structures was won by W. H. Hayes, supervisor of welders and grinders of the Georgia Power Company, for his article "Welding and Cutting Equipment Combined." The item tells in detail how an oxyacetylene cutting apparatus and a complete welding outfit were installed on one truck. This arrangement has proved to be of great benefit to the maintenance of way repair men, who are now enabled to do the cutting and welding of rails more quickly.

In the department of buses and garages, the article "Double Air Chuck Inflates Dual Tires Properly" was awarded the prize. This article was submitted by Richard Grant, formerly foreman of the Berea Garage of the Cleveland Railway. A unique method of inflating dual tires devised by the Cleveland Railways is described in this item, which appears elsewhere in this issue. In the electrical and line department only one item was received and for this reason the judges decided to make no award but to consider this article in the second period of the contest,

James Davidson

THE winner of the prize in the department of rolling stock and shops is James Davidson, assistant foreman in the mechanical department of the Cleveland Railways, Cleveland, Ohio. Mr. Davidson was born in 1886, and started to work for the company during September, 1907, as a carpenter in the department of equipment and building. With the exception of one year, when the Cleveland Railway was operated by the Municipal Traction Company, Mr. Davidson has been in the employ of the same company since 1907. He advanced to the position of assistant foreman of the erecting department in 1913, which position he is holding at the present time. Mr. Davidson has always been much interested in the simplification of methods in the shops of his department, and many improvements have resulted from ideas which have been originated by him during his connection with the Cleveland Railways.

Richard Grant

IN THE department of buses and garages the prize winning item was submitted by Richard Grant, foreman of the Berea Garage, Cleveland Railway, and was entitled "Double Air Chuck Inflates Dual Tires Evenly." Mr. Grant died on Feb. 11, 1930, as the result of injuries received in an automobile accident. He was 39 years old and had been in the employ of the Cleveland Railway since August, 1926. He was greatly liked by his fellow workers and his death will be felt very keenly by all those who were in close contact with him in the daily performance of their duties.

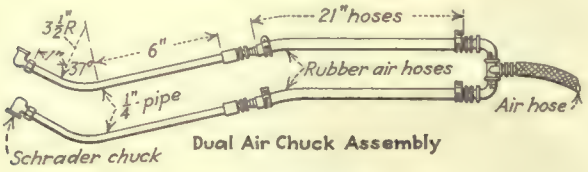
W. H. Hayes

IN THE department of way and structures the prize was awarded for the article "Welding and Cutting Equipment Combined," submitted by W. H. Hayes, assistant roadmaster Georgia Power Company, Atlanta, Ga. Mr. Hayes worked from 1908 to 1918 as bill clerk and rate clerk for the A.&W.P. R.R. at Hogansville and La Grange, Ga. Not being satisfied with this type of work Mr. Hayes decided to take up welding, a practice which gained a great deal of favor during that time. He joined the Navy in 1918, and followed a six months training course, after which he was detailed at the Navy Yard in Norfolk as ship welder, and held this position until 1921. When leaving the Navy Mr. Hayes was employed by the Georgia Power Company as a welder, and after two years was promoted to the position of supervisor of welders and grinders, which he is holding at the present date.

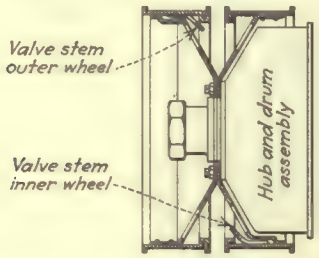
Double Air Chuck Inflates Dual Tires Evenly*

By Richard Grant
Foreman Berea Garage Cleveland Railway

DEVELOPMENT of a double air chuck has greatly facilitated inflation of rear wheel dual tires to the proper pressure on buses of the Cleveland Railway. The single fitting was found unsatisfactory, since it was difficult if not impossible to inflate the inside and outside



Dual Air Chuck Assembly



Wheel Assembly

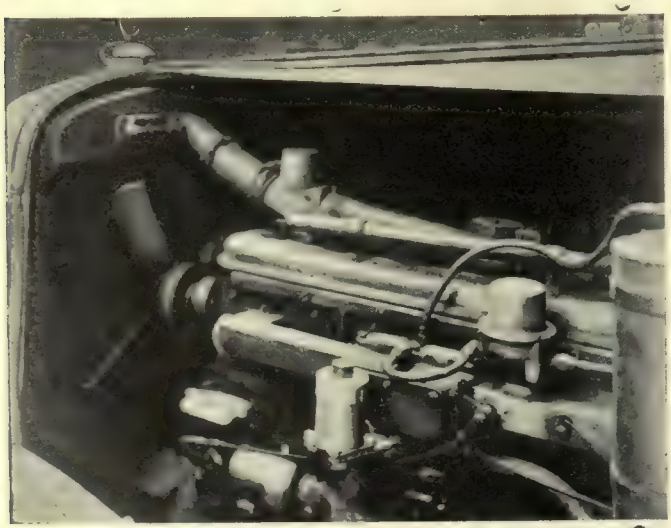
Use of this double air chuck developed by the Cleveland Railway has facilitated inflation of dual tires

tires properly with several sizes in use. Correct inflation is of importance if maximum mileage and minimum road failures are to be attained.

The double air chuck illustrated enables the operator to reach without difficulty the valve stems, regardless of type or angle. Its use has brought about a far better condition of the tires on rear wheels, and has reduced the time for inflation materially, resulting in a saving of labor.

Electric Governor for Buses

HOOKED in the control circuit of the generator which supplies energy to the motors driving the bus, an automatic electric governor built by the General Electric Company according to specifications of the International Bus Company, Buffalo, N. Y., prevents high generator voltage. Excessive speed of the bus is thus avoided, as is also flashover on the motor commutator. The device consists of a solenoid-actuated lever which operates a butterfly valve on the carburetor. All gas-electric buses operated by the International Bus Company have been equipped with this new device.

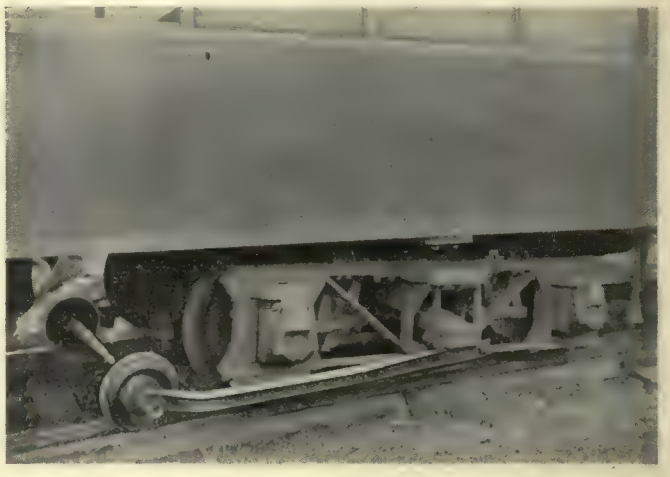


An automatic electric governor is located directly above the carburetor on buses of the International Bus Company, Buffalo, N.Y.

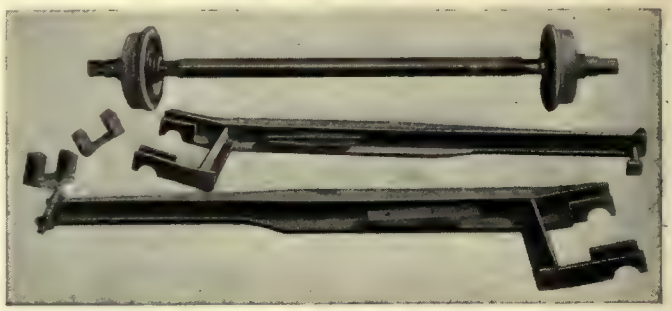
Emergency Dolly for Broken Axles*

By E. J. Jonas
Superintendent of Equipment Cincinnati Street Railway

TRAFFIC delays due to broken axles are reduced to a minimum by means of a dolly designed in the shops of the Cincinnati Street Railway. The device can be harnessed to a broken truck by the repair crew to bring the car in to the shops. The device used has a weight of 445 lb. The center portion of the dolly axle



Dolly used by Cincinnati Street Railway to bring in car with broken axle



When not in use dolly can be taken apart easily and carried on the emergency truck

is of 3-in. steel tubing shrunk on to 2-in. solid ends. The wheels are free to revolve on the axle, and each has an annular groove in a bronze bushing which is filled with lubricant by means of a pressure gun. Two sets of truck frame supporting blocks accommodate the two types of trucks used by the company.

On a paved street two men can install the emergency dolly with ease in a short time. To accomplish this the truck is jacked up and wheels rolled into place. This being done, the end members are then coupled and the car is ready to move. A 2-mile run at normal operating speed over curves and special work has been made with this device without trouble of any kind.

**Submitted in* Electric Railway Journal *Prize Contest.*

Safety Holder for Dipping Armatures*

By W. A. Traw
Armature Room Foreman Dallas Railway & Terminal Company

With a new safety yoke of ½x2-in. iron bar designed and used in the shops of the Dallas Railway & Terminal Company an armature prepared for dipping and baking is supported from the bottom and is locked



Holder for armatures designed and used by the Dallas Railway and Terminal Company

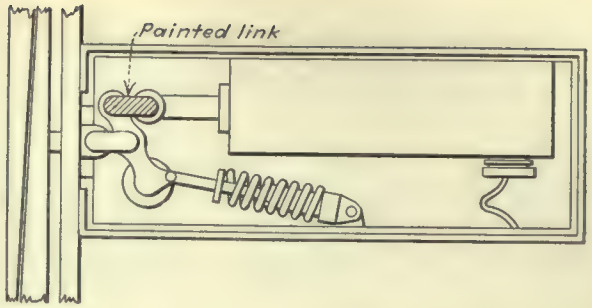
in such a position that it is almost impossible for it to slip out of the holder before being dipped. Formerly on one or two occasions the old-style clamp put on the commutator end of the armature shaft slipped off with an almost disastrous result when an armature fell to the floor, barely missing a workman.

It should be noted that one size yoke will take practically every size and type of railway armature from 25 to 65 hp.

Disconnecting Locked Tongues of Electric Track Switches*

By G. I. Grant
Chief Inspector School of Instruction
Toronto Transportation Commission

Locked tongues due to ice-coated plungers in electrically operated switches make it necessary for operators to disconnect the tongue from the plunger by the removal of a link in the mechanism. Several car derailments have occurred on the lines of the Toronto



When the link to be removed to release a frozen electric track switch was painted a distinctive color derailments were reduced in Toronto

Transportation Commission when the wrong link has been removed and the tongue thereby cut free from its locking spring. In addition to diagrams posted in carhouses and lectures given to new men in the school of instruction, a further aid to operators has been provided by painting the proper links with a distinctive color.

Electrically Heated Inspection Lamps*

By Christ Reinker
General Foreman Mechanical Department
Cleveland Railway

A trouble light that is particularly adapted for use in cold weather has been designed at the Havard shops of the Cleveland Railway for the use of the line department. It consists of a handle, 8 in. long and 2 in. in diameter, with a conical reflector 5 in. long. The wooden handle, drilled with a number of ¼-in. holes, contains a 2,500-ohm resistance, properly insulated, which acts as a heater. The resistance is in series with a 110-volt, 23-watt Mazda lamp located within the reflector. This light is especially advantageous when work must be done to the overhead in tunnels, under bridges, or at night when the weather is cold, as it keeps the hands of the workman warm and permits him to do his best work.

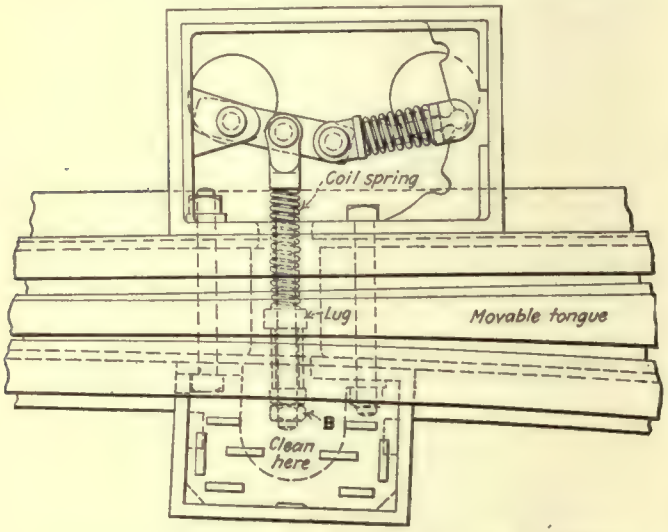


Inspection light used by Cleveland Railway has electrically heated handle

Improved Connecting Rod for Tongue Switches*

By E. B. Spenzer
Way Department Cleveland Railway

DECREASED wear on the working parts of lock boxes of track switches has resulted in Cleveland from the use of a coil spring placed on the connecting rod between the tongue and the yoke. This spring is adjusted just under tension and takes up any slack motion due to the wear that occurs, thus reducing the likelihood of having a split switch. The frequency of inspection is materially decreased, which gives the switch crew more time for other work. Construction of this connecting rod is simple and easy. Ordinarily the connecting rods are threaded the entire length to provide for the nuts, which hold and adjust the pipe separators. With the new design this is not necessary, for the entire adjustment is taken care of at the nut *B* at the end of the rod, as shown on the accompanying sketch.



Coil spring on connecting rod reduces wear on switches of the Cleveland Railway

*Submitted in Electric Railway Journal *Prize Contest.*

Welding and Cutting Equipment Combined*

By W. H. Hayes
Assistant Road Master Georgia Power Company
Atlanta, Ga.

COMPLETE welding and cutting equipment in a single unit, consisting of a Una Type D-4 electric welder and an oxy-acetylene cutting outfit, installed on a 1-ton White truck, has been found very useful by the Georgia Power Company. Two such trucks have been equipped. Considerable time has been saved by having these units together, as the men do not have to wait for the equipment to be moved, especially when jobs located at various places have to be taken care of. In particular, each man can do his own burning instead of having to wait for someone to come and do it for him.

When special work has worn down and become noisy it is built up by welding and ground to a smooth surface. This repair lasts about two years under heavy traffic and longer when traffic is lighter. A hard center broken beyond repair is taken out, and a piece of steel cut and laid in the casting and welded into place. Then it is built up to the same dimensions as the old hard center by welding and ground down to a smooth surface. This lasts as long as the other work in the same location, which saves the expense of taking out the whole frog and replacing it with a new one or installing a new center. If the ball of the rail is broken away from a joint a plate is put on the outside of the rail and welded to the base while it is ground to a smooth surface after cooling.



A complete electric welding set and an oxy-acetylene cutting equipment are mounted together on a 1-ton White truck by the Georgia Power Company



This machine in the Cleveland Railway shops is used to shape hood rims or carlins

Hood Rims and Carlins Reshaped by Machine*

By James Davidson
Assistant Foreman Mechanical Department
Cleveland Railway

FORMING hood rims and carlins in the shops of the Cleveland Railway has been expedited by the development of a machine for forming these parts. This replaces the old method of shaping by hand with clamps.

The machine consists essentially of a table with the form for a hood rim or carlin placed on it and a flexible steel band attached to a pneumatic cylinder. A cylindrical steam chest is conveniently located to steam the wood. The strip to be bent is placed in position; then the air is admitted to the cylinder, and by means of levers the steel bands shove the board to the required position of the hood or carlin. After the piece is shaped it is placed on a form and slats are nailed in position.

Reclaimed Crank Case Oil for Curves and Switches

By Louis T. Botto
Superintendent Maintenance of Way
San Antonio Public Service Company

AFTER considerable experimentation the maintenance of way department of the San Antonio Public Service Company has adopted the practice of using oil drained from automobile crank cases for oiling the curves and switches over its system. This oil has a very high lubricating value and is much more satisfactory than the crude oil formerly used. Its use has resulted in a saving of $30 per month.

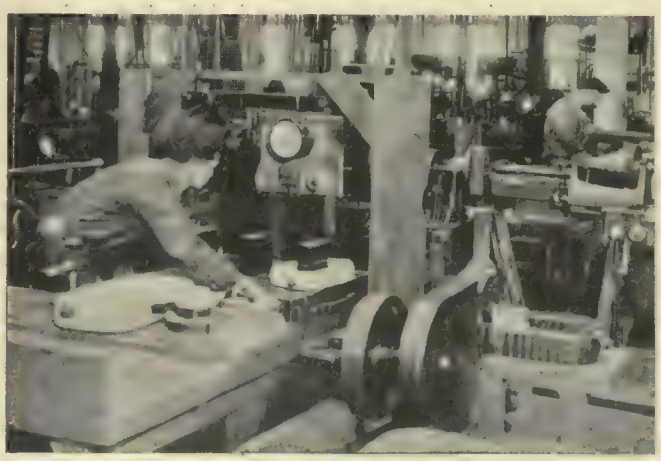
Corrections

In the article "Spray Equipment Effective for Weed Killing" appearing on pages 104-105 of the February issue of this paper, it was stated that a speed of 40 m.p.h. is required to discharge 472 gal. per mile of track. The figure 40 m.p.h. is a typographical error and should read 14 m.p.h.

On page 108 of the same issue, in the article "Combination Tie Plate for Various Rails," the phrase "tie plates in various sizes" should read "a combination tie plate" to fit the different rail widths.

Field Testing and Taping

TESTING field coils is considered of sufficient importance in the Cold Spring shop of the International Railway, Buffalo, N. Y., to have an especially designed testing outfit for this purpose. All coils are checked at some time between their final taping and their dipping. A first test is usually made when the coils come out of the motor; the second test after the coil is repaired and the third test after the coil has been dipped. A Peerless Equipment taping machine saves the labor of three men at 50 cents per hour, with a resultant saving of something like $4,050 a year on the basis of a 54-hour week. The $300, which represents the cost of the taping machine, is paid for a dozen times over, as a consequence.



Field coil testing device and taping machine used in Cold Springs shop of the International Railway, Buffalo, N. Y.

Advantages of Single-Motor Drive for Gas-Electric Buses

By C. A. Atwell
Design Engineer
Westinghouse Electric & Manufacturing Company

GAS-ELECTRIC buses of recent design use either one, two or four driving motors. There are certain fundamentals in the design of a single motor of large capacity, however, which give it advantages over two or more motors of equivalent total capacity. These advantages are: less weight; less cost; more rugged construction; higher efficiency; less inspection and maintenance required and the use of simpler control and wiring allowed.

The decreased weight of one motor as compared to two or more motors of equivalent capacity is due to the requirement of less total active copper and iron to produce the same result, and also to the fact that the weight of the mechanical parts of the single motor is less than the total for the smaller motors. The net result is that the single motor weight is 15 to 20 per cent less than the weight of two motors which do the same service, and this percentage will be increased in a comparison of the single motor with four motors capable of performing the same service.

The manufacturing cost of the single motor is less, not only because of less total material used, but also because of the reduced number of manufacturing operations. It is easy to see that it will not take as much labor to wind one armature as it does to wind two smaller ones of approximately half the size.

Better mechanical construction can be obtained in the single motor because of the relatively larger parts throughout. This applies especially to the electrical windings. A single motor, for example, uses a single-turn armature coil while the usual motor for a dual drive equipment uses a two-turn armature coil. It is generally true that electrical apparatus of larger rating has higher efficiency. Comparison of existing single-drive and dual-drive bus motors shows the single motor to have between 2 and 4 per cent higher efficiency over the operating range. The point of maximum efficiency for the single motor is around 92 per cent, and for the dual-drive motor, 89 per cent.

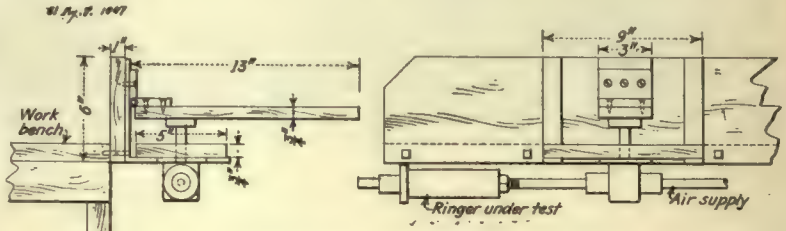
Inspection and maintenance for a small motor require practically the same work as for a larger one; thus the amount of this item will be practically proportional to the number of motors. The bus wiring is simplified by the use of a single-drive motor as it is necessary to carry only one set of power cables from the controller to the motor.

In general, it appears that the disadvantages of the single motor drive are: lack of the "motor series" connection; 1 to 1½ in. increase in bus floor height or decrease in ground clearance; inability to obtain independent traction on each driven wheel.

Opposed to these disadvantages are the six inherent advantages of the single motor already mentioned and, in addition, the weight and cost savings effected in the bus construction by the fewer number of motor supports, driving gears, propeller shafts and universal joints or couplings. Evaluation of these advantages and disadvantages for a gas-electric bus of given size and weight to operate in a certain service should give a rather definite indication as to whether the single-motor drive should or should not be used.

Hand Lever for Testing Pneumatic Bell Ringers

TESTING pneumatic bell ringers is done by means of a simple and convenient device in the shop of the Richmond Railways, Staten Island, N. Y. This outfit was designed and constructed by Equipment Inspector Nicksie. A 1-in. x 6-in. plank is bolted to the end of the work bench. A standard foot valve and pin are mounted on a ¾-in. x 5-in. x 9-in. plank which is supported by two 1½-in. x 1-in. hangers fastened to the work bench plank. One side of this foot valve is connected to the air supply and the other side is supplied with a long nipple threaded on both ends.



Simple device for testing of bell ringers

The ringer to be tested is screwed on the end of this pipe. A tapered wooden handle, 13 in. long, ¾ in. thick, 3 in. wide on one end and 1 in. wide on the other, is hinged and fastened to the bench plank directly over the center of the valve plunger. Pressing down on this handle compresses the valve plunger, admitting air to the ringer under test.

Proper Fit of Brushes Reduces Chatter

By W. E. Warner
Brentford, England

APART from mechanical vibration of the motor, brushes chatter from two causes, an uneven commutator surface or a bad fit of the brushes in their holders. If the micas stand above the segments the brushes are sure to vibrate, and sometimes with recessed micas vibration occurs also. This is caused by the sharp edges of the segments and can be prevented by filing a very slight bevel on the edges so as to present a rounded edge to the brush. It is desirable to sand the commutator after the micas have been recessed. If the brushes are badly fitted in their holders they will vibrate, although a certain amount of clearance is necessary to permit the free movement of the brush, which, however, should not be excessive. A well-fitted brush should slide freely up and down, although motion backward or forward is undesirable. When brushes do not fit properly and others cannot be procured, a practical remedy is to dust the edges of the brush and the inside of the holder with powdered flake graphite. This graphite will take up the clearance between the brush and the holder and take up the play, and not prevent free movement of the brushes.

NEWS *of the Industry*

LATE NEWS

Akron, Ohio—Approximately $400,000 will be spent in Akron during 1930 by the Northern Ohio Power & Light Company looking toward a betterment of the railway lines and the improvement of car service.

✦

New York, N. Y.—The Interborough Rapid Transit Company is to install a turnstile at the Grand Central Terminal station with a new type of gears, designed to eliminate noise. If successful the device will be placed on all turnstiles.

✦

Louisville, Ky.—In police court, on Feb. 18, Robert Falls, seventeen years of age, was fined $10 for hooking a ride on the back of a car of the Louisville Railway. Neil W. Funk prosecuted the case as head of the claim department of the railway. He cited numerous instances of boys and other persons who hang to street cars, and asked that an example be set in this case.

✦

Albany, N. Y.—The New York State Automobile Association went on record on Feb. 25 opposing any increase in the motor fuel tax this year.

✦

Indianapolis, Ind.—The Public Service Commission has approved a petition of the Peoples Motor Coach Company and the Pennsylvania Railroad to establish a new bus line between the Union Station in Indianapolis and the Hawthorne freight yards. The English Avenue route will be abolished as soon as the new line direct to the downtown district is started. The Peoples Motor Coach Company is owned by the Indianapolis Street Railway.

✦

San Francisco, Cal.—The Key System Transit Company announced that deposits as of Feb. 14 indicate payments under subscription for new preferred stock of $3,995,825 against required amount of $3,500,000.

✦

St. Louis, Mo.—The aldermanic committee on streets and sewers has approved a proposed ordinance for the widening of Broadway between Morrin Avenue and Switzer Avenue. The Broadway tracks of the St. Louis Public Service Company are to remain on the west side of the street. Alderman Kuhs informed the committee that neighborhood opposition to the tracks on the west side had been withdrawn. The railway said it would substitute buses for the street cars north of Taylor Avenue should it be required to undertake the costly work of placing the car tracks in the center of the widened street.

✦

Washington, D. C.—The Federal Trade Commission resumed on Feb. 24 its hearing in connection with the financial phase of the public utilities.

(*Late News Continued on Page 00*)

Fares to Be Increased by Detroit Municipal Railway

New Cars, New Buses and Trackless Trolleys Included in Program for Modernizing System—$3,000,000 Increase in Gross Expected

A FLAT rate of 8 cents for both street car and bus fares with no charge for transfer has been voted by the Detroit Street Railway Commission to go into effect on March 15. The new rate is an increase of 2 cents for cash fares on the cars and a decrease of 2 cents in bus fares. It was passed by a vote of two to one, Commissioner Frank Couzens dissenting. The increase has been approved by Mayor Bowles. The fares charged on the department's de luxe buses will remain unchanged.

The new plan calls for selling four tickets for 30 cents or ten for 75 cents for use on either street cars or buses. The present rate on street cars is 6 cents cash fare or nine tickets for 50 cents. One cent is charged for transfer on street cars. No tickets are now sold on the buses, the cash fare being 10 cents with free transfer. Children will be allowed to ride on cars and buses for 6 cents.

Price, Waterhouse & Company, public accountants, estimate that on the basis of the relative number of cash and ticket riders carried on the system in 1929, and after making allowance for a possible shift in the trend of traffic from cars to buses, it would appear that the suggested fare adjustments should produce in 1930 $3,000,000 more in gross revenue than was produced in 1929, provided there is no decrease in the number of passengers carried.

General Manager Smith stated that the additional revenue derived from the increased fares will permit the department to expand its express service on several main arteries and will enable it to add approximately 200 units of rolling stock to present equipment this year. It is planned to retire entirely this year all of the department's single-truck cars and to add a number of buses to the present service, establish new routes, etc. Many substantial improvements will be made at once, but the full program of modernization is not expected to be completed for two years.

Mr. Smith said that within 30 days he can have all of the present rolling stock in good shape and can place 150 cars, now in the yards, back in service before March 15. The percentage of crippled cars is higher now than usual because shop forces were decreased due to losses in revenue during December and January. An endeavor was made to keep operating expenses commensurate with income.

In replying to the Mayor Mr. Smith said he was sure the 8-cent fare need not be continued in force longer than eighteen months or two years, because at the end of 1931 the department will have finished paying off its D.U.R. debt (approximately $9,000,000), and other carrying charges

(*Continued on Page 167*)

COMING MEETINGS

March 11—Twelfth Annual Convention—Oklahoma Utilities Association, New Tulsa Hotel, Tulsa, Okla.

March 19-20—Illinois State Electrical Association, Illinois Gas Association, Illinois Electric Railway Association—Hotel Abraham Lincoln, Springfield, Ill.

March 28—Annual Meeting—Maryland Utilities Association, Willard Hotel, Washington, D. C.

April 9-10—Central Electric Railway Master Mechanics Association, Mansfield, Ohio.

April 29-May 1—United States Chamber of Commerce, Washington, D. C.

May 14-15—Association of Electric Railway Equipment Men, Middle Atlantic States, Scranton, Pa.

June 23-26—American Electric Railway Association, 49th annual convention, San Francisco, Cal.

July 23-25—Electric Railway Association of Equipment Men, Southern Properties, Nashville, Tenn.

Scope of Brady Awards Broadened

A new basis has been announced by the American Museum of Safety for the Anthony N. Brady Memorial Medals for 1929. Instead of requiring the presentation of a formal brief the contest will be judged upon the comparative showing of the electric railways in the various classifications as set forth in their accident statements submitted on the forms provided for the purpose to the American Electric Railway Association.

The committee on award will take into consideration also any supplementary statement or information bearing upon accident prevention or safety work received prior to the closing date, April 1, 1930. The winners will be announced at the A.E.R.A. convention in San Francisco in June. Under the conditions all electric railways which file the stipulated statements will be afforded an equal opportunity in their respective classes.

LATE NEWS

(*Continued from Page 165*)

Boston, Mass.—Postponement for two weeks has been ordered on hearing of the bill which would authorize the Eastern Massachusetts Street Railway to acquire the securities of the Boston & Revere Electric Street Railway, Winnisimmet Railroad, Boston & Chelsea Railroad and East Middlesex Street Railway.

✦

Denver, Col.—The Denver Tramway Company has placed two more bus routes in service and abandoned the railway route operated from the Union Station far out into the Park-Hill district. The bus lines connect in the outlying residential district with other railway lines which start from the Union Station. This eliminates duplicate transportation throughout the business section of the city.

✦

Springfield, Ill.—Realizing the possible need of future electrification, the Chicago & Illinois Midland proposes to purchase the Chicago, Springfield & St. Louis line from Springfield to Lock Haven, Ill., on condition that it can acquire a 200-ft. right-of-way in open stretches and 100-ft. around towns. With this same idea in mind, the Midland has acquired a 200-ft. right-of-way from Springfield to Peoria.

✦

Los Angeles, Cal.—A petition has been filed with the Los Angeles Council to require the Los Angeles Railway to extend its West Adams Street line to Culver City. The same petition asks that the lines of the company be extended to Moynier Lane.

✦

Ithaca, N. Y. — The Public Service Commission has authorized the Ithaca Railway, Inc., to exercise a franchise from the city for the operation of its trolley line in that city. On Dec. 5 last the commission denied a like application because the company had not applied to and received approval from the commission for the reorganization of the Ithaca trolley line. The reorganization was approved on Jan. 23 last.

✦

Richmond, Va.—An investigation into a revision of rates in the interest of increasing travel on the line will be undertaken by the Richmond-Ashland Electric Railway. President Zimmer reports that traffic has improved in recent months and that it now appeared that the company would be able to met the interest on its bonds in July. Because of the extraordinary expense connected with repairs and a loss of traffic while this work was under way, the company defaulted its interest payment on Jan. 1. To bring about a closer relationship between the company and people living in the territory served by the line, J. A. Schermerhorn and J. R. C. Brown have been added to the board.

✦

Boston, Mass.—Differences of opinion between the city and the Boston Elevated Railway over the question of financing a subway under Governor Square appeared just as pronounced as ever before the legislative committee on metropolitan affairs at the recent hearing, but Henry I. Harriman, chairman of the Elevated board of trustees, suggested that the committee appoint a sub-committee to meet with the trustees and the Mayor with a view to bringing about an agreement so that legislation could be passed at the present session. The burden of Mr. Harriman's argument has been that the Elevated road could not meet the entire cost of rental, which is $135,000 a year on the $3,000,000 relief project.

✦

New York, N. Y.—The Pennsylvania Railroad's proposal to establish bus transfer service at Newark and New York has been assigned by the Interstate Commerce Commission for hearing on March 26. The commission previously had suspended operation of the tariff filed by the Pennsylvania to meet the competition of the Baltimore & Ohio. The commission has not formally announced whether the investigation incident to the Pennsylvania's tariff will also include the Baltimore & Ohio's practice, inaugurated several years ago without authorization from the commission, but it is probable that the legal status of the Baltimore & Ohio's policy will be brought into the issue at the hearing.

✦

Kansas City, Mo.—The limited-stop plan of street car operation will be applied to several more lines by the Kansas City Public Service Company. Streets on which lines involved in the change now operate have been made safety stops for intersecting vehicular traffic. An actual check on lines to which the skip-stop plan has been applied shows a saving in time of from 18 to 25 per cent. Under the plan, stops usually are made at every other block on north and south streets, and every third block on east and west streets. The plan aims at passenger stops from 1,100 to 1,200 ft. apart.

✦

Youngstown, Ohio—The Youngstown Municipal Railway has asked permission of the state Public Utilities Commission to buy the Park & Falls electric line, 3.8 miles long, for $575,333, to be paid for with a 7 per cent promissory note. The West End Company has asked authority to buy the Youngstown-Sharon interurban line, 13.6 miles in length, for $2,133,978, to be paid for by a 6 per cent promissory note.

✦

Fishkill, N. Y.—The Fishkill Electric Railway has applied to the Public Service Commission for permission to substitute buses for street cars in Fishkill. The municipal authorities have consented to the substitution. It is proposed to operate buses along the Beacon-Fishkill road from the Beacon city line through Fishkill township and village to the eastern terminus of the present trolley line.

✦

Louisville, Ky.—A plan to sell two power plants and all substations of the Louisville Railway to the H. M. Byllesby Management & Engineering Company for $3,000,000 and an underwriting of $3,000,000 in refunding bonds by a local syndicate have been suggested as a means for the refinancing of $6,000,000 in first mortgage 6 per cent bonds due on July 1, 1930. The proposal for the sale of the power plants is not a new one, but the prospects for the consummation of the deal would appear to be good, particularly since it is understood that rates for purchased power as recently suggested come closer to meeting the ideas of the railway management than any that have heretofore been suggested.

✦

Cascadia, Wash.—The Oregon Electric Railway's project to build a line from Albany to Cascadia, Wash., 40 miles, has been modified to provide for joint use of the Southern Pacific's line between Albany and Lebanon. The rest of the project, which includes three branch lines, will be carried out as originally planned in the application submitted to the Interstate Commerce Commission by the Linn County Logging & Lumber Railway. The application has been amended accordingly and the Southern Pacific has withdrawn its opposition to construction of the line, which will tap extensive timber lands on the west slope of the Carcade mountains.

✦

St. Louis, Mo.—Bids are being taken on the concrete substructure for the Illinois Terminal Railroad's new elevated line in St. Louis to connect the McKinley Bridge with the proposed subway under Twelfth Street between Cass Avenue and the new freight and passenger terminal at Twelfth Street and Lucas Avenue. President Fischer, of Illinois Terminal, says the steel for the superstructure is being fabricated. Excavating for the 3,000-ft. subway portion will be started as soon as the elevated line has been installed and the city has completed condemnation of property needed to widen High Street to a 100-ft. boulevard. Two tracks will be installed in the subway, but it is designed to care for six tracks eventually.

✦

Ottawa, Ont.—Red Line, Ltd., has appealed to the Second Divisional Court at Toronto against a judgment of Magistrate Hopewell of Ottawa who fined it $10 and costs for unlawfully competing with the Ottawa Electric Railway within the city limits in carrying passengers. Appellant operates a sightseeing bus from the Chateau Laurier under agreement with the hotel, charging $1 per head. The Ottawa Electric Railway also operates a sightseeing bus line along the same route.

✦

New York, N. Y. — Stockholders of the Commonwealth & Southern Corporation, Allied Power & Light Corporation and Penn-Ohio Edison Company approved on Feb. 10 a plan of merger and consolidation of the Commonwealth & Southern Corporation, Allied Power & Light Corporation, Commonwealth Power Corporation, Penn-Ohio Edison Company and Southeastern Power & Light Company, and specifically approved the agreement of merger and consolidation of the three companies incorporated in Delaware, namely: the Commonwealth & Southern Corporation, Allied Power & Light Corporation and Penn-Ohio Edison Company, thus completing the first and most important step in the simplification of the corporate structure of the Commonwealth & Southern System. Stockholders of the Maine corporations, namely, Commonwealth Power Corporation and Southeastern Power & Light Company, over 96 per cent of the common stock of which is already owned by the Commonwealth & Southern Corporation, will meet later.

Progress Reported on Washington Merger Legislation

After having decided to separate the section pertaining to court appeals from the resolution permitting the Washington railways to merge, the Senate District committee has announced that action on the merger proposal will be deferred until disposition has been made of the court section. Under the present arrangement, the section formerly attached to the merger agreement, which limits the right of utility companies to appeal to the courts in rate cases, will be handled as an amendment to the utility act. It is contended by the utility commission that under the present law the companies can submit matters of fact as well as matters of law to the courts.

Meanwhile, practically every section of the bill has been agreed upon by the committee. There is some dispute, however, over the rates of fare for school children. Although the amendment relating to court appeals on rate cases will be reported out first, both of the bills will be placed together on the Senate calendar.

Under the terms of the merger bill, the lines of the Westinghouse Railway & Electric Company and the Capital Traction Company will be consolidated as the Capital Transit Company. The bus properties of the Washington Rapid Transit Company also will be acquired by the new organization. It is also provided that the rates of fare in effect on Aug. 1, 1929, shall remain unchanged for a period of two years after the consummation of the merger. The companies are relieved of their present burden of paying the expenses of traffic policemen at street railway crossings and intersections. In addition, instead of being compelled to pay the entire cost of maintaining the paving between the rails and for 2 ft. outside of the outer rail, the new company will only have to pay one-fourth of this expense.

New Franchise Proposed for Rochester

The New York State Railways, Rochester Lines, now in receivership, and the city of Rochester have reached an agreement whereby the service-at-cost contract, controlling railway operations, may be continued to Aug. 1. Meanwhile a new contract will be drafted to supplant the present one, voided automatically with the receivership.

The railway acceded to demands of the Council that a 5-cent fare be established for school children and that tickets be sold on electric cars and buses at a rate of six for 50 cents or twelve for $1. The straight fare is 10 cents.

Changes in New York Utility Regulation Recommended

Two reports have emanated from the commission on revision of New York state utility laws. Of these reports, that prepared by Colonel Donovan, counsel to the commission, proposes a revision of the New York statutes which would recognize the established law of the land regarding valuation. He recommends further that the Public Service Commission be given the legal powers and facilities it needs to effect real regulation, based upon adequate research of its own and including supervision of utility accounting and finance. These provisions he would supplement by a declaration of legislative policy favoring voluntary agreements between the commission and the service companies for rate regulation through accounting control, in the hope of reducing the great volume of protracted and unsatisfactory litigation over rates.

Professor Bonbright and Frank P. Walsh, two of Governor Roosevelt's three appointees, declare for enactment of the "prudent investment" theory of valuation. They embrace the idea of duplication of gas and electric plants and distributing systems by municipalities, if only as a means of compelling the companies to "help rather than hinder regulation in order to retain the private ownership method," and favor creating a so-called people's counsel. Continuation of the existing situation, say the Governor's appointees, will inevitably present government ownership in some form as the only solution, but they hasten to add that "we do not feel that public opinion is yet ready for that alternative."

Arrange Your A.E.R.A. San Francisco Itinerary Now!

American Electric Railway Association headquarters has just mailed to all members a handsomely illustrated brochure covering the three special trains for the San Francisco convention—a red, a white, and a blue. The first two trains provide for travel through some of the most picturesque points in the country. The blue special is a fast train for those whose time is limited. All prospective passengers must determine their return routing when tickets are purchased for the going trip in order to take advantage of the special round-trip summer tourist rates. Return tickets are good until Oct. 31. Intending passengers are asked to consult their local railroad ticket agents. A special railroad travel expert will also be glad to discuss plans for the entire trip, make up a definite itinerary and procure accommodations. No charge is made for this service.

June is a month of particularly heavy travel, and in order to secure the newest and most up-to-date equipment the committee should know well in advance the number of persons for whom accommodations are to be arranged on each train. The letter and the confirmation blank enclosed with each booklet contain instructions as to how to arrange for the trip.

A.E.R.A. delegates are October minded so far as the American Electric Railway Association convention is concerned. The convention this year takes place in June, three months earlier than usual.

The hotel committee has issued a circular giving hotel rates and instructions about securing accommodations in San Francisco. Delegates should communicate with Chairman Heise at the address shown in the hotel folder. For the convenience of those who intend to visit Los Angeles for the special two-day program to follow the convention, the committee will have a representative at the registration desk in San Francisco. A stopover for a day at Portland, where they will be entertained locally, is planned for the white special enroute to San Francisco. As in the past, railroad and Pullman representatives will have a headquarters at the registration desk to validate tickets.

The West Coast entertainment committee will shortly announce its program for the entertainment of delegates.

It is fifteen years since A.E.R.A. delegates and their ladies have had an opportunity to visit California for a convention.

Get Set for San Francisco

PRESIDENT SHOUP extends a most cordial invitation to come to California next June. The West Coast committees under W. V. Hill, manager of the California Electric Railway Association, as general chairman, are sparing no pains to help make this one of the most memorable of association conventions. The officers and the executive committee are enthusiastic and hope for a large delegation. They join with President Shoup in extending a cordial and hearty welcome to all delegates, their families and guests.

Detroit Fares to Be Increased

(*Continued from Page* 165)

will also be much reduced by reason of the added revenue. The last installment on the D.U.R. purchase debt is due Dec. 31, 1931. The clearing up of this obligation will release more than $2,000,000 annually to the department.

On Feb. 19 Mr. Smith announced that the purchase of 150 new street cars, 125 motor coaches, installation of express railway service on Fort Street and Michigan and Hamilton Avenues, and rebuilding of tracks on several lines, will be among the first improvements undertaken by the Department of Street Railways, under the fare increase. In addition, the first installation of trackless trolleys will be effected at an early date on Plymouth road.

The new trackless trolley line is to be about 3½ miles long. The new cars will be of the Peter Witt type, and the majority of the new coaches will be of the single-deck street car type.

Auditor Morgan says that despite the increase in fares the department, if it insists upon purchasing 125 new cars and 125 motor coaches, may find itself in debt again. He said:

"I can not say whether we will actually be in debt until the budget has been made up and careful estimates prepared. In the D. S. R. budget there is an item of $2,530,000 for 100 street cars and 75 motor coaches. The department has wanted this additional equipment for a year but I opposed it because the money was lacking. If the funds are not in sight in the future, I will continue to oppose the purchase of this equipment."

According to Mr. Morgan the fare increase is necessary to take care of past accruing deferred maintenance and to set up a depreciation reserve with which to meet future replacements of worn-out equipment.

The D. S. R. is including $7,000,000 in bonds in its new budget. This, Mr. Morgan said, is to take care of "past neglected maintenance" and to take up $3,000,000 in short time obligations which are now on a 6 per cent interest basis. The new bonds will reduce this charge to 4½ per cent.

South Bend System Reorganized

New Company Formed to Take Over Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway

WITH the approval of the federal courts on Feb. 11, one of the final steps was taken in lifting the receivership of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway. A new company known as the Northern Indiana Railway, Inc., will take over the assets of both the former companies. It is believed that under the new capital plan it will be possible to rehabilitate the properties, add new rolling stock, and extend the lines to take care of the expanding requirements for transportation of the communities the company serves.

Faced with continued losses in riding due to competition from the private automobile, the Chicago, South Bend & Northern Indiana Railway was forced into receivership in July, 1927. In December of the same year its affiliated property, the Southern Michigan Railway, also went into receivership. In both cases R. R. Smith, vice-president and general manager of the companies, was named receiver by the federal courts. Attempts made previously to effect voluntary reorganization were found to be impractical. It was believed, however, that a plan of reorganization could be formulated which would provide a financial set-up making it possible to continue operations on a basis where capital and credit could be attracted and the properties rehabilitated.

Old Financial Set Up Unwieldy

Under the financial set-up prior to the receivership there were three underlying mortgages in addition to the Chicago, South Bend & Northern Indiana Railway mortgage. Of these three prior liens, the first underlier, the Indiana Railway first mortgage, with principal maturing on Jan. 1, 1930, has paid interest regularly. The properties were, therefore, sold subject to this mortgage, which is being extended for six years during which a sinking fund will retire the bonds. The old funded debt was as follows:

Indiana Railway first mortgage 5's, $426,000.

Northern Indiana Railway first consolidated mortgage 5's, $558,000.

LaPorte & Michigan Traction Company first mortgage 5's, $312,000.

Chicago, South Bend & Northern Indiana Railway first mortgage 5's, $3,089,000.

Funded debt on the property of the Chicago, South Bend & Northern Indiana Railway totaled $4,415,000. In addition there were $2,500,000 in 5 per cent noncumulative preferred stock and $5,000,000 in common stock.

Funded debt of the old Southern Michigan Railway was as follows:

South Bend & Southern Michigan Railway first mortgage 5's, $536,000.

Southern Michigan Railway first consolidated 5's, $395,000.

This made a total of $931,000 in bonds.

Up to Jan. 1, 1930, the funded debt of the Chicago, South Bend & Northern Indiana Railway was $598,350 in arrears on interest. This accrued interest is being so adjusted in the reorganization that with the bonds on both properties the total funded indebtedness amounts to $5,944,350.

Under the new set up, the Northern Indiana Railway, Inc., will have the following capitalization:

Indiana Railway first mortgage 6's, $426,000.

Northern Indiana Railway first mortgage 5's, $1,533,085.

No par common stock to the amount of 100,000 shares.

This compares with the old capitalization of $5,944,350 in bonds and $5,000,000 in common and $2,500,000 in preferred stock.

After six years, when the $426,000 in Indiana Railway bonds has been paid off through the sinking fund, the funded debt of the new company will be $1,533,085.

The newly organized Northern Indiana Railway, Inc., will control and operate the railway and bus lines in South Bend, Mishawaka, Elkhart and Michigan City and the interurban lines connecting South Bend, Elkhart and Goshen; South Bend, LaPorte and Michigan City, and South Bend, Niles and St. Joseph.

The local lines in South Bend and Mishawaka, cities which adjoin and have a population of 135,000 people, operate on thirteen different routes. They serve the Studebaker Corporation, the Oliver Farm Equipment Company, Bendix Aviation Company, Mishawaka Rubber & Woolen Mills and a large number of other manufacturing industries. Operation in South Bend covers approximately 49 miles of track and the bus lines operate over 16 miles of streets.

The city street car fare is 7 cents cash, four tokens for 25 cents. The bus fare is 10 cents cash or three tokens for a quarter. An additional charge of 2 cents is made on transfers issued from street cars to buses.

In Elkhart, with approximately 35,000 people, the cars operate over approximately 14 miles of track. In addition a bus line covers a section of Elkhart not served by rail. Here also transfers are issued between cars and buses.

In Michigan City, with 30,000 people, the cars operate over 7 miles of track, serving the Pullman Car Company, the Sullivan Machine Company and other industries.

The interurban lines operate in three directions from South Bend. They serve a thickly populated district from which many passengers commute to the cities through which these lines pass. Freight is moved over these lines. On the line east of South Bend, connections are made with electric lines serving the Central Electric Railway territory with freight service, direct connection by electric lines being afforded to the Ohio River at Louisville and Cincinnati, with through tariffs with steam roads operating in the southern territory.

The interurban line north of South Bend connects with the Michigan Central Railway south of St. Joseph, Mich., and through tariffs are afforded from points on this division to all steam roads in the Central Freight Association territory.

Plans Additions to Track and Rolling Stock

Arrangements have been made to issue treasury bonds to finance additions and extensions required by the growth of South Bend and other communities served. Funds also will be obtained to rehabilitate the present rolling stock and to purchase ten new interurban and ten city cars under the car trust equipment method.

Planning Wisely for Cleveland's Future

ONE virtue of the Cleveland Railway's plan to embrace the whole county in a single transportation system is that it will encourage Cuyahogans outside the parent city to think in terms of metropolitan development. The transportation future of this community is bound to the policies of the Cleveland Railway to a degree sometimes not understood. Reports submitted to the railway indicate that good service is considered by passengers more important than low fare. It is illustrated in the case of the 25-cent express bus line now serving a small area of the Heights. Speed and comfort outweigh in importance the amount asked at the fare box. If the company can deliver passengers downtown—where most of them want to come—quickly and in comfort at a reasonable rate of fare it will find its chief difficulty surmounted. The county should think in terms of metropolitan living.—*Cleveland Plain Dealer.*

"Jim" Barnes Complimented by Louisville Employees

On the occasion of his tenth anniversary as president of the Louisville Railway on Feb. 11, James P. Barnes was the guest at a banquet in his honor. Five hundred members of the Louisville Railway family gave their chief a rousing ovation. Neill Funk, claim agent of the company, acted as toastmaster. He paid high tribute to Mr. Barnes as an organizer and executive, hailing him as "one of the finest men who has ever been connected with a transportation company in America."

After representatives of various departments had paid individual tribute to their chief, Mr. Barnes spoke briefly but feelingly. He told the employees that everything that had been accomplished had been due to their efforts; that his direction had been only incidental. He recalled that the company had won the Brady Award for safety several years ago and had twice received honorable mention in that contest. He said that the day-to-day friendly co-operation extended to him had been a real inspiration, esponsible in large measure for any success the company had attained.

New Terminal Planned in Uniontown, Pa.

Plans for the new building to be occupied by the West Penn Railways in Uniontown, Pa., have been completed and work will be carried through to completion as rapidly as possible. The building is to be 140 ft. long, 50 ft. wide and two stories high. It will be finished in ornamental brick.

West Penn Railways will use part of the first floor for waiting room facilities and offices for the dispatcher and superintendent. On the second floor will be offices, as well as quarters for train crews. The railway track will form a loop around the building so that incoming cars will circle the terminal to discharge and pick up passengers from a platform protected by an overhanging roof.

Providing Rapid Transit a City Responsibility

Negotiations are under way to fund the $3,690,284 floating debt of the Cincinnati Street Railway. So Walter A. Draper, president, told stockholders in his annual report made on Jan. 29. Mr. Draper's report showed a total capital value as of Dec. 31, to be $34,996,240. The value of property fixed by city ordinance on Nov. 1, 1925, was $27,000,000. Additions and betterments since that year total $6,887,659.

Choosing the topic, "Looking Ahead," Mr. Draper said in part:

"In many cities the problem of local mass transportation has reached a status requiring pointed consideration and readjustment. Opinions may differ as to the transportation of the future.

"There is no doubt that private facilities have carried an increasing number of people each year. But some public transportation always must be ready to serve, and it is necessary for the modern operator to endeavor to provide facilities that will most readily meet requirements and at a reasonable cost.

"If transportation companies cannot provide the capital necessary for constructing subways and other forms of rapid transit, the municipality will be required to aid in providing facilities. In New York, Philadelphia, Boston, and other cities various forms of municipal assistance have been extended, ranging from actual municipal ownership to the payment of subsidies of some nature.

"The form of contract existing between the Cincinnati Street Railway and the city lends itself readily to the working out of the problem as may be found necessary and best.

"The present transportation system with addition of cars from time to time is adequate to care for many more passengers than now are carried. Nevertheless, new forms of rapid transit service are being urged. The substitution of such additional facilities could not be undertaken by this company without costs too great for the users of the service to bear. The extent to which the city could participate in providing rapid transit would depend entirely upon the plan that was to be followed.

"It is hoped the fare which has continued more than four years will provide funds sufficient to meet all requirements. Should the fare control fund, however, be materially reduced, there are several ways of helping to meet the situation. One would be to have the city relieve the company of all charges that still are imposed as burdens on the car riders. Another would be to have the city, with its ability to raise money at a low rate of interest, provide certain facilities to be used by the transportation system. A charge for transfers is becoming more general throughout the country."



Overcoats were much in vogue at the recent Birmingham, Ala., meeting of the Association of Equipment Men, Southern Properties, as evidenced by this view showing the delegates wading through 5 in. of snow on the grounds of the Continental Gin Company. Following a visit to the Birmingham Electric shops, the group went to the cotton gin plant for an inspection trip and luncheon as guests of Tom Elliott, president of the company and for several years previous an executive of the Cincinnati Car Company

Ideas for Selling the Service

Inspiration for electric railway advertising men was furnished at a recent sales meeting of the Procter & Gamble Company, Cincinnati, world famed makers of Ivory soap. The advertising department desired to impress the sales force pictorially with the strength of street car advertising as used by the Procter & Gamble Company to advertise its products and reinforce the efforts of the sales department. Four large posters, two of which are reproduced herewith, were prepared by Barron G. Collier, Inc., and were loaned to the Procter & Gamble Company for this meeting. The original posters were brilliantly produced in color, making them extremely effective. They were 40 in. high and 24 in. wide. The novel comparisons employed suggest interesting copy for selling local transportation.



Novel comparisons made in Procter & Gamble (Ivory Soap) advertising suggest copy for selling local transportation

Rerouting Plan in Omaha Changed

As a result of dissatisfaction with the rerouting of the Omaha & Council Bluffs Street Railway, Omaha, Neb., which went into effect in December, a new plan has been determined by company officials to go into effect on March 2 for 60 to 90 days.

The new plan attempts to satisfy complaints made ever since the Harris rerouting plan was put into effect. Demands of Thirteenth Street property owners, who ask resumption of tram service on this street, have not been met, but President Shannahan has promised to endeavor to work out a satisfactory solution. Mr. Shannahan said: "The company is willing to give the city anything in the way of transportation it wants, providing it pays the bills. Rerouting has not proved the saving in expense anticipated. Any increased service now will only add to the company's deficit. If the commissioners will join with the company in applying to the state railway commission for better service, and if the city is willing to pay for it, we shall gladly join."

Unification Bill for New York City Introduced

A bill amending the public service commission law of New York State setting up a board of transit control in the city of New York was introduced in the New York State Senate and the Assembly on Feb. 25 by the minority leaders, Bernard Downing and Irwin Steingut. The measure represents the views of the city of New York on how unification of transit facilities can be brought about. Among other things it guarantees a 5-cent fare which would be maintained, in case of a deficit in operation, by the tapayers of the city of New York. The bill is accompanied by a statement of the minority leaders. A similar bill introduced in 1928 and again in 1929 failed to be reported in either house. It is not thought likely that the measure which has now appeared will be reported this year.

Window Wipers for Providence Cars

Recently the United Electric Railways, Providence, R. I., appropriated sufficient money to equip all of its street cars with window wipers. For some time the company has realized that operation without window wipers during stormy weather was unsatisfactory, hazardous and not consistent with safety promotion work among the employees.

Experiments were made with several window cleaners, and a wiper has been selected which will keep the glass clean during rain and snow storms and will remove sleet. The window wiper is manually operated by a hand lever near the top of the window. The operator pulls this lever and the wiper sweeps the width and length of the window, cleaning it all in one movement. Up to Feb. 15, 28 cars had been fully equipped. Wipers are on hand sufficient to equip more than 100 cars within a few weeks. It is hoped that every car on the system will be equipped by March 1.

Simpler Car Parts Proposed

O. C. Wright, superintendent of equipment of the St. Louis Public Service Company, St. Louis, Mo., in an address before the February meeting of the Birney Club, called attention to the weight of accessories on the ordinary car. A pointed question asked by the speaker was if anyone ever heard of a street car, even if it was 30 years old, which during its entire life ever had anything taken off of it. He also questioned if apparatus designed to be used on a street car was worked out in conjunction with the car body or other parts to which it is to be atttached.

A little-known fact brought out by the speaker is that for the purpose of taking power from the trolley through the motors to the ground and through the auxiliary apparatus on a modern car 50 ft. long, approximately 2,500 ft. of copper wire of various sizes is used. Some 400 ft. of pipe, or eight times the length of the car, is used to provide air brake and power door operation. Most of this consists of expensive copper tubing.

Additions of one kind or another to the equipment, Mr. Wright believes, run the cost of the modern car up to figures almost prohibitive, increase the weight, and make the operation more complex and the maintenance more difficult. He believes the time is opportune to wipe the slate clean and develop a design of a railway vehicle in which all component parts will be worked out, each in its proper relation to the other. He believes that if this plan is followed, it should be carried forward with the initiative supplied by the operator and concurred in and supported by the car builders and manufacturers of car equipment.

Protest Against Competitive Service Sustained

Setting aside a decision handed down by the Ohio Public Utilities Commission last June, the Ohio Supreme Court has ordered the Salisbury Transportation Company to return to a two-hour schedule, sustaining a protest filed by the Stark Electric Railroad against the increased service.

The two companies operate between Alliance and Canton, Ohio. The Stark Electric operates interurban cars while the Salisbury company operates buses along a route part of which parallels the Stark Electric tracks and part of which is several miles from the railway.

Last summer the state commission authorized the bus company to use two buses on an hourly schedule. The Stark Electric said the increased service was not necessary. When its protest was ignored the Stark Electric appealed to the Supreme Court.

A Source of Facts on Track

"Uniform Paved Track" is the title of the new, enlarged third edition of the "Paved Track Notebook" issued by the International Steel Tie Company, Cleveland, Ohio. In it previous data are brought up to date. The addition of a wealth of new material makes this handbook 25 per cent larger, more interesting, more useful.

The mortar-flow principle, the improved method of concreting paved track with the revolutionary "Mortar-Flow Pulsator" is fully explained. Details of how best to install compressed concrete paving, and of how to use the new vibrated grout method of construction for early service are given.

Research results on concrete and steel bond are presented for the first time. Modernized twin ties with the new "Precision" rail clip and heat-treated bolts are completely described.

Two new types of track construction are shown. Paved track design is discussed from the executive's viewpoint.

Unit pressures on the subgrade with concrete foundation and stone ballast are compared. A new section has been added on waterproofing the track structure and subgrade drainage.

Initial cost comparisons are given for typical installations. A table of units of track work per man-hour on more than 60 miles of track, permits application of these data to local conditions.

A reference section with notes on concrete, and a convenient table of cubic contents of typical track trenches completes the "Uniform Paved Track Notebook."

Conspectus of Indexes for February, 1930

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years High	Last Five Years Low
Street Railway Fares* 1913 = 4.84	Feb., 1930 **7.87**	Jan., 1930 **7.85**	Feb., 1929 **7.75**	Feb., 1930 **7.87**	Feb., 1925 **7.24**
Electric Railway Materials* 1913 = 100	Feb., 1930 **142.9**	Jan., 1930 **144.4**	Feb., 1929 **145.0**	Dec., 1926 **159.2**	Feb., 1928 **139.5**
Electric Railway Wages* 1913 = 100	Feb., 1930 **231.7**	Jan., 1930 **231.3**	Feb., 1929 **229.9**	Feb., 1930 **231.7**	Feb., 1925 **221.0**
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	Feb., 1930 **203.9**	Jan., 1930 **204.5**	Feb., 1929 **205.2**	Nov., 1928 **205.7**	July, 1929 **199.0**
General Construction Cost Eng'g News-Record 1913 = 100	Feb., 1930 **206.5**	Jan., 1930 **209.0**	Feb., 1929 **210.4**	Jan., 1927 **211.5**	Nov., 1927 **202.0**
Wholesale Commodities U. S. Bur. Labor Stat. 1926 = 100	Jan., 1930 **93.4**	Dec., 1929 **94.2**	Jan., 1929 **97.2**	Nov., 1925 **104.5**	Jan., 1930 **93.4**
Wholesale Commodities Bradstreet 1913 = 9.21	Feb., 1930 **11.51**	Jan., 1930 **11.68**	Feb., 1929 **12.98**	Dec., 1925 **14.41**	Feb., 1930 **11.51**
Retail Food U. S. Bur. Labor Stat. 1913 = 100	Jan., 1930 **155.4**	Dec., 1929 **158.0**	Jan., 1929 **154.6**	Nov., 1925 **167.1**	Apr., 1925 **150.8**
Cost of Living Nat. Ind. Conf. Board 1914 = 100	Jan., 1930 **160.4**	Dec., 1929 **162.0**	Jan., 1929 **160.9**	Nov., 1925 **171.8**	Apr., 1929 **159.3**
Industrial Activity Elec. World, kw.-hr. 1923–25 = 100	Jan., 1930 **121.8**	Dec., 1929 **116.4**	Jan., 1929 **132.5**	Feb., 1929 **140.4**	Aug., 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	Jan., 1930 **95.2**	Dec., 1929 **98.6**	Jan., 1929 **108.7**	Oct., 1929 **111.8**	Nov., 1926 **94.0**
Business Failures Number	Jan., 1930 2368	Dec., 1929 1827	Jan., 1929 2184	July, 1929 1581	Sept., 1928 1348
Liabilities, Millions of Dollars	**78.55**	**67.38**	**56.19**	**102.09**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Decision Reserved in Buffalo Fare Case

Federal Judge Hazel in United States District Court at Buffalo, N. Y., has reserved decision on the application of the International Railway for appointment of a three-judge court to fix a valuation figure upon which fares may be based. The railway seeks a 10-cent fare in Buffalo and increased fares in Niagara Falls and Lancaster. Judge Hazel indicated that he would give the cities in which increased fares are asked sufficient time in which to prepare for the suit. It also was indicated that the court would like to have the railway take its case back to the commission.

Another Fare Proposed in Columbus, Ohio

A 7-cent cash fare with five tickets for 35 cents has now been proposed by the Columbus Railway, Power & Light Company, Columbus, Ohio, but the City Council has voted to postpone action on the proposal. The company has been operating without a franchise since 1926, but has kept the fare at 6 cents cash since that time.

$1,250,000,000 for New York's New Rapid Transit Lines

The 1929 annual report of the New York Transit Commission emphasizes progress in grade crossing elimination during the year, mentioning particularly the fact that plans have been agreed upon for doing away with "Death Avenue" in New York City as part of the West Side improvement.

It also mentions prominently settlement of a large number of disputed accounting items as a result of which the Interborough Rapid Transit Company paid New York City $6,291,118 on account of accrued deficit up to June 30, and $2,309,696 thereafter, and also put $2,958,881 into the depreciation fund for the period up to June 30, and $500,000 for the succeeding six months.

Of the new subways, the report says that although parts of the Eighth Avenue system are to be in operation in 1931, the commission's estimates of traffic are so large that already East Side trunk lines are being planned; the city's investment in existing subways is $380,000,000; the Eighth Avenue system is to cost $650,000,000 and the other new lines are to cost $600,000,000 more.

The report traces the progress of the Interborough 5-cent fare litigation during the year. The commission says that this issue "involved a tremendous amount of work, attracted national attention and engaged the leading lawyers of the country," and remarks that it "was most fortunate" in having as its chief counsel Samuel Untermyer, who, with his son, Irwin, "successfully upheld the contentions of the commission and the city on the contract" and performed all of these services without charge.

Engineers Inspect Cleveland Terminal

Inspection of the electrification being installed for the operation of the steam railroads entering Cleveland as operated by the Cleveland Union Terminals Company was the feature of the meeting of the committee on heavy electric traction of the American Electric Railway Engineering Association held on Feb. 19.

Following a short business meeting, luncheon was served in the rooms of the Cleveland Association of Commerce. The party was then taken over the terminal building, the electrified tracks and the locomotive repair shops. The meeting and trip were arranged by W. E. Huber of the Electric Railway Improvement Company and L. W. Birch of the Ohio Brass Company. It was made possible through the courtesy of Messrs. Jouett and Pinkerton of the Terminal Company.

Members who were present included L. C. Winship, chairman; H. F. Brown, C. H. Jones, K. T. Healy, Mr. Billau representing J. H. Davis, J. S. Hagan, O. E. Staples representing S. B. Cooper, E. P. Chase representing J. V. B. Duer, W. E. Huber, F. W. Butt, A. H. Daus, Morris Buck, J. M. Bosenbury, L. W. Birch, H. H. Febrey, J. T. Hamilton, W. M. Vandersluis, J. S. Thorp and G. I. Wright. Guests present included Messrs. Bovard, Pierce, D. H. Moore, E. B. Moore and Tieterman.

Brady Medals Awarded at Meeting in New York City

In the presence of members of the Metropolitan Section, A.E.R.A., and visitors from other cities the Anthony N. Brady Memorial Awards for safety of operation during the year 1928 were presented at the Engineers' Auditorium, New York City, on Feb. 7. Edward Dana, general manager, Boston Elevated Railway, accepted the gold medal for cities of the first class. He brought with him to share the honors five operators, one chosen from each division of the property because of outstanding accomplishment in safe operation over a period of years. The Tampa Electric Company, winner for the second time of the silver medal for cities in the second class, was represented by Superintendent Sheridan and two operators. The bronze medal for cities in the third class, was again awarded to the Tide Water Power Company, Wilmington, N. C. Honorary mention went to the Louisville Railway and to the El Paso Electric Company.

Charles Gordon, managing director, A.E.R.A., addressed the meeting. He said that accidents to passengers on electric railways are decreasing steadily. Only one passenger out of every 280,000,000 carried last year was fatally injured. This record was made possible by an unceasing and aggressive campaign of accident prevention in which the electric railways are constantly engaged.

An inspiring address by Harry Cordell, master mechanic, Chicago, North Shore & Milwaukee Railroad, was a feature of the meeting.

First Serious North Shore Accident in Ten Years

Eleven persons were killed and many were injured when a Chicago-bound passenger train of the Chicago, North Shore & Milwaukee Railroad struck an automobile at a grade crossing just north of Kenosha late on the night of Feb. 23 and was derailed.

The automobile was hurled directly into the path of a northbound freight train, as the five cars of the passenger train left the track.

The first car of the passenger train buried its nose in the soft mud of the ditch. The car behind piled into it. The three rear cars also went into the ditch, but their passengers were more fortunate than those in the two forward cars.

It was the first time in ten years that a passenger on the North Shore Line had met death in an accident.

The facts appear to be that the occupants of the automobile which was struck ignored the warning signal at the crossing, paid no attention to another private car which had been brought to a stop near the crossing and then in an effort to beat the northbound freight crossed directly in the path of the on-rushing southbound passenger train.

In accordance with its regular policy, the Interstate Commerce Commission will investigate the accident. To that end A. H. Leonhart, from Green Bay, and H. M. Burtch, from Chicago, inspectors of the commission, have been ordered to Kenosha. It is not believed that the report from these inspectors will be submitted to the commission much before the end of March.

400 Newark Cabs Pass to the Public Service

Public Service Co-ordinated Transport, Newark, N. J., has acquired control of Yellow Cab, Inc., through purchase of the majority of the capital stock. Yellow Cab, Inc., is the largest taxicab company in north Jersey and operates in Newark and vicinity. It also controls the Yellow Cab of Union County and the Brown & White Taxicab Company of Newark. It operates 400 cabs in Newark. Public Service will take over active operation as soon as details can be arranged. No announcement was made as to the consideration paid for the stock.

TWENTY YEARS' GROWTH IN TOTAL OF REVENUE PASSENGERS

	1909	1919	1929
Interborough Rapid Transit Company:			
Subway	238,430,146	461,147,058	932,446,803
Elevated	276,250,196	348,188,600	348,569,124
New York Rapid Transit Corporation and predecessors	143,816,821	305,021,402	690,829,232
Total	658,497,163	1,114,357,060	1,971,845,159
Surface car passengers	729,728,127	879,536,422	984,596,886
Bus passengers	3,609,304	36,983,726	125,326,259
Grand total	1,391,834,594	2,030,877,208	3,081,768,304

RAPID TRANSIT TRAFFIC IN WORLD'S LEADING CITIES

	Passengers Carried in 1928	Miles of Double Track	Passenger Per Year Per Kilometer	Percentage of Total Traffic Carried by Subways
New York	1,910,000,000	211	6,200,000	57
London	465,112,000	155	3,000,000	30
Paris	818,334,000	68	7,300,000	55
Berlin	265,229,000	38	4,800,000	20

Progress Reported in Springfield, Ohio

Settlement of the transit problem at Springfield, Ohio, apparently awaits a decision of the courts as to whether paving assessments and unpaid franchise fees constitute a lien on the company's assets, prior to the rights of the bondholders. A four-hour conference on Feb. 21, however, between the city officials and executives of the Cincinnati & Lake Erie Railroad, with Thomas Conway, Jr., president, acting as spokesman, served to clear up a number of confusing points.

The railway company proposes to purchase the property of the Springfield Railway from the receiver, and then to set up a system whereby some of the present narrow gage tracks will be continued and others abandoned in favor of the standard gage service over the interurban tracks, augmented where necessary by trolley bus service. It was agreed that the company would be relieved of future paving assessments if the city loses in its present suit against the street railway receiver.

The main problems at present are those of a twenty-year franchise, a service-at-cost plan, and the appraisal of the railway under the service-at-cost plan. The company offered to reimburse the city for his service charge if an expert appraisal engineer estimated the property at a lower valuation than that contained in the company's proposal.

BOOK REVIEWS

Mastering a Metropolis

"Planning the Future of the New York Region." By R. L. Duffus. Harper & Brothers, New York. 302 pages, illustrated. Price $3.

City and regional planners, architects, and those interested in the growth of the modern city will find this book fascinating reading. City dwellers and commuters, especially those who live in the New York region, will be relieved as well as interested by the projects now under consideration, which are so clearly and entertainingly set forth in this volume.

"Planning the Future of the New York Region" really is the authorized popularization of the ten detailed and technical volumes published by the Committee on the Regional Plan of New York and Its Environs. The author describes in popular language the outstanding features of the comprehensive plan worked out by this committee after seven years' study and research at a cost of $1,000,000. Many maps and illustrations help the reader visualize the extraordinary development which is outlined here.

Review of New York Association's Work

Proceedings of the quarterly and annual meetings in 1924 and 1925 of the New York Electric Railway Association; 373 pages; published by the association.

The meetings of state and sectional associations, being smaller than those of national associations, afford an intimacy of contact among the members not offered by the larger organizations. They are, therefore, often productive of very valuable material. The sessions reported in this volume are of that nature.

Railroad Electrification Economics

"Electrification of Steam Railroads." By Kent T. Healy, assistant professor of transportation, Yale University. McGraw-Hill Book Company, Inc., New York. 395 pages, illustrated. Price $5.

Professor Healy's treatise on steam railroad electrification was written following a six-month survey of the electrifications of Europe, which was made subsequent to several years of experience with one of the leading electrified steam railroads of America. The author has stressed the economics of electrification, devoting an entire chapter to this subject, and considering each element from this standpoint.

Power and its supply are given a prominent place in the book, taking somewhat more than half of the space. The power contract is analyzed in considerable detail, since the author devotes much of his attention to the purchase of energy from some outside source. Substations, switching and sectionalizing are taken up in two chapters, the various methods used in this country and in Europe being discussed in detail. Overhead supporting structures, the contact system, co-ordination of electric fields and economics of transmission and distribution are covered in five chapters. Motive power, including current collection, traction motors and control, transmission of power from the motors to the driving wheels and mechanical elements of locomotives, is analyzed for many types of equipment.

The book is valuable for the engineer or the economist who is considering electrification as a means of improving railroad operation. It gives information which is essential in making a comparison between existing methods with steam and the methods that have been developed in successful electrifications. The author does not contend that electrification is useful everywhere. He says that it now is possible to study "the principles involved which are decidedly topics for discussion, and the indication of the dangers which are ever present in any analysis."

Electric System Handbook

By Clarence H. Sanderson, editor-in-chief. First edition. Illustrated. McGraw-Hill Book Company, New York. 1,167 pages. $5.

Here is a handbook different from those usually presented. It tells the story of the electric system as a whole in form which can be understood by the non-technical reader. It is more in the nature of a textbook than a handbook, as the term ordinarily is understood. Students of engineering, operators, inspectors, maintenance and test department employees and engineering draftsmen should find it helpful.

Railway substations, including the use of mercury arc rectifiers and automatic control equipment, are discussed in a separate section of 67 pages.

Annual Safety Congress Transactions

National Safety Council, Publicity Division, Chicago, Ill. 325 pages. 50 cents.

Complete transactions of the public safety, education and women's sessions of the Eighteenth Annual Safety Congress, held in Chicago, Sept. 30-Oct. 4, 1929, are now available. The volume contains authoritative papers and discussions on public education for safety, uniform traffic laws and ordinances, accident reports and statistics, law enforcement, traffic engineering and control, traffic signs and signals, mental and personal causes of accidents, school safety work, junior safety councils, vocational schools, and safety work of women's organizations.

Elektrische Bahnen

By D. O. Höring. Published by Siemens & Halske, A. G., and Siemens-Schuekertwerke, A.G., Berlin, Germany.

This book discusses in detail the development of the electric street railway and electric railroad since the first appearance of an electric train at the Industrial Exhibition in 1879 in Berlin. The extent of electrification in Europe is reviewed in the first chapter and it was found that at the end of 1927 the mileage of electric railroads amounted to 5,387 miles, while countries outside of Europe had electric railroads amounting to 3,157 miles.

The various types of electric motor cars and locomotives are discussed extensively while the advantages of alternating current and direct current are compared also. Although the book discusses especially the rolling stock, considerable attention is given to way and structures, and overhead and signal construction and installation.

Safeguarding Instalment Sale Contracts

"Conditional Sales. Law and Local Practices—for Executive and Lawyer." By Roger Sherman Hoar. The Ronald Press Company, New York. 521 pages. $10.

Selling of goods on the instalment plan has become one of the standard commercial practices all over the United States. The author indicates in detail the legal differences between various plans in use for instalment selling, and the dangers that beset the seller if the contract is not properly drawn and executed. Since practice varies in the several states, each one is taken up in detail, and local practice and tactics are explained where the law is not clear.

While sales of rolling stock under equipment trusts are not considered in detail, the author points out that special laws covering such sales exist in all states and territories except the District of Columbia, Texas and Virginia. Some of the laws in other states do not differ greatly from the general laws.

Any railroad or other utility buying or selling merchandise on the instalment plan will find in this book a wealth of information, with specific references to decisions on the various points involved.

Steam Railroad Statistics for 1928

Forty-second Annual Report on the Statistics of Railways in the United States. Interstate Commerce Commission. Government Printing Office, Washington, D. C. For sale by the Superintendent of Documents. $1.40.

This is the annual report of the Interstate Commerce Commission on the operation of the steam railroads for 1928, but it includes selected data on other common carriers subject to the interstate commerce act, among them statistics of 223 electric railways reporting to the commission. For 1928 the electric railways had gross revenues of $167,173,838 on an investment of $1,264,533,842 for road and equipment.

PERSONAL MENTION

Henry Bucher of Interstate Assumes New Duties

Takes Up Post in Indianapolis in Which He Will Co-ordinate Interurban and City Lines of Vast Insull Undertakings

HENRY BUCHER, recently appointed general railroad executive of the electric railway properties in Indiana controlled by Midland United Company, has taken over his new duties at Indianapolis.

Operation of the electric interurban and street railways of the Indiana Service Corporation, Interstate Public Service Company and Northern Indiana Power Company will be co-ordinated under Mr. Bucher. This will involve no change in ownership or identies, but efforts will be made to obtain the advantages of one general supervision.

Mr. Bucher has been manager of railways of the Indiana Service Corporation



Henry Bucher

at Fort Wayne for the past six years, having succeeded Sam W. Greenland in 1924. More recently, he also has held the position of manager of the Fort Wayne division of the Indiana Service Corporation, Northern Indiana Public Service Company and Northern Indiana Power Company, in charge of gas, electric and railway properties.

Prior to his going with the Indiana Service Corporation in 1924, Mr. Bucher was associated as a consulting engineer for ten years with Robert M. Feustel, now president of the Indiana Service Corporation and executive vice-president of the Midland United Company. While engaged in this work he made appraisals and valuations for many electric railways throughout the country. From 1910 to 1914 Mr. Bucher held a position with the joint engineering department of the Wisconsin Railroad Commission and the Wisconsin Tax Commission. He was graduated from the University of Wisconsin with an engineering degree in 1909.

William H. Snyder, chief clerk of the Indiana Service Corporation railway department since 1913, accompanied Mr. Bucher to Indianapolis, where he will continue as chief clerk of the co-ordinated railway department.

Mr. Bucher's position as division manager at Fort Wayne has been taken by Harry E. Vordermark, vice-president and treasurer of the Indiana Service Corporation. Assisting Mr. Vordermark as local managers are James S. Clark, light and power department; J. F. McKay, Fort Wayne city railways, and M. P. Royal, gas department.

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A. J. Berta Treasurer of North American Power Company

A. J. Berta, formerly assistant treasurer of the North American Light & Power Company, Chicago, and its subsidiaries, has been elected treasurer of these companies, succeeding P. L. Smith. As assistant treasurer, he was in close touch with every operating group. Mr. Berta's career in the public utility field began with the Middle West Utilities Company, in 1918. The foundation of his banking experience was obtained with the Harris Trust Savings Bank and the National City Company. The latter company lost his services when he was employed by Mr. Smith. On Feb. 16, Mr. Berta celebrated his tenth anniversary with this company and its predecessors.

✦

J. J. McNally in Advertising Field

James J. McNally, formerly with the advertising department of the Washington Railway & Electric Company and the Potomac Electric Power Company, Washington, D. C., has announced the organization of Associate Advertisers to conduct an advertising service specializing in utility accounts. The new service will also act as advertising counsel for public utilities and allied industries. Before going with the Washington Railway & Electric Company, Mr. McNally was connected with Samson Service.

✦

"Tom" Minary Resigns as Chairman at Louisville

Thomas J. Minary, chairman of the board of directors of the Louisville Railway, Louisville, Ky., for the past ten years, and prior to that president of the company, recently tendered his resignation to the directors. It was accepted and the post of board chairman was abolished. Mr. Minary remains on the board of directors.

The former chairman will have been connected with the company and its predecessors 58 years in May. Mr. Minary is now 79 years old. He became secretary-treasurer of the Central Passenger Railroad Company in 1872. He was only 21 years old at the time.

Consolidation in 1889 of this concern with the Citizens' Passenger Company and the City Railway resulted in the establishment of the present Louisville Railway. Mr. Minary became general manager after the consolidation. Then for a period of 23 years he served as president of the company before his election to the chairmanship of the board.

✦

Col. C. H. Harvey Made Chairman at Knoxville

Col. C. H. Harvey tendered his resignation on Feb. 8 as president of the Knoxville Power & Light Company, Knoxville, Tenn., a position he has held for more than 25 years, to gratify his desire for "greater leisure than is possible under present responsibilities." His resignation was accepted by the directors, who then elevated him to the chairmanship of the board—a post which will enable him to keep in close touch with the affairs of the company. The board took no action toward filling the presidency. The duties formerly performed by Colonel Harvey will be taken over by Fred. V. Underwood, the vice-president and general manager.

Colonel Harvey went to Knoxville in



Col. C. H. Harvey

1885, immediately following his graduation from the University of Michigan, and became secretary to the general manager of the East Tennessee, Virginia & Georgia Railroad, the predecessor of the Southern. While employed there, he worked at night on the books of the Knoxville Electric Light & Power Company. In 1902 he was appointed general manager of both companies and two years later was elected president and general manager.

Colonel Harvey organized the two utilities into the Knoxville Railway & Light Company, which later became the present Knoxville Power & Light Company. In 1925 Colonel Harvey gave up his duties as general manager, and since then has been engaged only in the administrative activities as president of the company.

Mr. Underwood went to Knoxville about five years ago to assume the duties of general manager. He has been connected with electric power interests practically all of his life and in Birmingham he held a position similar to that which he holds in Knoxville.

F. H. Brooks Now President of Lincoln Traction Company

F. H. Brooks of Lincoln, Neb., who was recently made president and general manager of the Iowa-Nebraska Light & Power Company and the Lincoln Traction Company, with headquarters at Lincoln, has been with the Continental Gas & Electric Corporation, a subsidiary of the United Light & Power Company, since its inception in 1913, first as general manager and then as vice-president and general manager of its properties in Nebraska, Iowa and Missouri, now known as the Iowa-Nebraska Light & Power Company.

Mr. Brooks' public utility career and operating experiences have been broad and varied. He started in the street railway field in Erie, Pa., in 1896. Later his activities took him into the copper regions of Michigan, where he did electrical engineering work for the Edison company of Sault Ste. Marie and the Peninsula Electric Light & Power Company. In this field



Frank H. Brooks

Mr. Brooks did pioneering work in hydro-electric and long-distance transmission development. Later he became general manager of the Vicksburg Railway & Light Company, Vicksburg, Miss.

In addition to management, operating and executive work, Mr. Brooks has also been active in state, sectional and national associations in the utility field.

✦

Chairman Prendergast Resigns from New York Commission

William A. Prendergast, chairman of the New York State Public Service Commission, tendered his resignation to Governor Roosevelt on Feb. 4. Governor Roosevelt said:

"Mr. Prendergast has had a very long and distinguished career as a public official and as member and chairman of the Public Service Commission. I regret he is bringing this long service to a close."

Chairman Prendergast issued a formal statement in which he said:

"At an interview with Governor Roosevelt I presented my resignation. The Governor has certain ideas relative to the regulation of public utilities in this state with which I am not entirely in sympathy. I do not feel that the Public Service Commission, which has quasi-judicial functions, should be influenced in the exercise of those functions by the executive or any other state agency. I explained my attitude upon these matters to the Governor. I appreciate the Governor's generous statement regarding my resignation."

The present commission is composed of three Democrats and two Republicans. The new chairman will be named by the Governor, but will have to be confirmed by the Senate. Mr. Prendergast's resignation became effective on Feb. 28.

✦

Changes in El Paso Personnel

F. J. Gannon, since January, 1929, manager of the El Paso Electric Company, Rio Grande Valley Traction Company, and the Mesilla Valley Electric Company, has been made president of these companies and a member of their boards of directors. Mr. Gannon has been president of the El Paso & Juarez Traction Company, and a member of its board since his advent in El Paso. In his new position he will continue actively to manage all four companies.

R. O. Himel, formerly assistant treasurer of the El Paso Electric Company, Rio Grande Valley Traction Company and Mesilla Valley Electric Company, has been made treasurer of the companies. For some time he has been a director of the El Paso & Juarez Traction Company.

J. B. Ledlie, formerly superintendent of the Mesilla Valley Electric Company, Las Cruces, N. M., a subsidiary of the El Paso Electric Company, has been made vice-president of the Mesilla Valley company.

L. S. Thorne, general superintendent of railways, El Paso Electric Company, is also a director of the El Paso & Juarez Traction Company.

✦

Central Association Vice-Presidents

R. R. Smith, of the Chicago, South Bend & Northern Indiana Railway, was elected first vice-president of the Central Electric Railway Association, and F. H. Wilson, of the Cleveland-Southwestern Railway & Light Company, was elected second vice-president at the recent winter meeting of the organization held in Cleveland. The names of the two vice-presidents were interchanged in the article in the ELECTRIC RAILWAY JOURNAL for February, 1930, page 90.

✦

M. E. Welsh in Charge of Central's Electric Division

Michael E. Welsh, superintendent of the Syracuse division of the New York Central Railroad, has been made superintendent of the electrical division with headquarters in New York City. Charles E. Olp, superintendent of the Rochester division, will succeed Mr. Welsh at Syracuse.

Mr. Welsh has been associated with the New York Central ever since he was twenty years old. He entered the service as a brakeman on the Syracuse division in 1891. Four years later he was promoted to be freight conductor and in 1901 was made passenger conductor. In 1907 he became assistant trainmaster and was elevated to trainmaster of the Rochester division in the following year.

Three years later he was sent to Buffalo as trainmaster and in 1918 was made assistant superintendent there. Mr. Welsh was superintendent of the Ontario division with offices in Oswego in 1923, and superintendent at Buffalo later the same year. He went to Syracuse as superintendent of the Syracuse division in 1927.

Two New Vice-Presidents for St. Louis Car

Nelson L. Rehnquist and Howard R. Gass were elected vice-presidents of the St. Louis Car Company, St. Louis, Mo., at the annual meeting on Jan. 28. George L. Kippenberger was elected first vice-president and assistant general manager. Edwin B. Meissner was re-elected president and general manager.

Mr. Rhenquist joined the St. Louis Car organization in 1911 when President Meissner came from the Milwaukee Electric Railway & Light Company to accept the executive direction of the company. With the St. Louis Car Company Mr. Rhenquist worked up through several positions until in 1916 he was made purchasing agent. When the company entered the airplane construction field a year ago he was asked to give executive attention to that division, but continued to supervise the purchases for the company. As vice-president he will continue as execu-



Howard R. Gass

tive for the aviation and purchasing departments.

Mr. Gass has served as a sales engineer since he joined the company on May 1, 1921. As vice-president his duties will be connected with the sales department. For seven years prior to joining the company, he was with the Missouri Public Service Commission. He had charge of the field operations for the commission in connection with the United Railways, the Union Electric Light & Power Company, the Kansas City Railways and the Electric Light Company of Kansas City valuations as well as other similar undertakings. He also inspected all steam and interurban railroad properties for the state commission annually.

Prior to entering the service of the Missouri commission, Mr. Gass was a field engineer for the North Kansas City Development Company in charge of levee, sewer, street paving and building operations. He has also been associated with the Kansas City Southern Railroad, the Missouri, Kansas & Texas, the Chicago, Rock Island & Pacific, the St. Louis-San Francisco Railway and the New York Central Lines as a locating and construction engineer.

As a field engineer for Paret & Beard, consulting engineers, Kansas City, Mo., he made hydro-electric surveys on the Waschita River in Arkansas, and also basic surveys and estimates for the Wichita Terminals and a valuation of stock yard properties in Wichita. He had charge of the subway and viaduct construction, third

division, Kansas City Terminal Railways, and also was in charge of pre-cast slab concrete construction and of all subways and viaducts during the building of the Union Station and terminal project in Kansas City, Mo.

A. N. Baldwin, long connected with the Central California Traction Company, Stockton, Cal., as secretary and treasurer, has been elected a director of the Yellow & Checker Cab Company, San Francisco, Cal.

✦

Messrs. Draffan, Springer and Strickler Advanced

Announcement has been made by the Ohio Brass Company, Mansfield, Ohio, of the election of G. L. Draffan as secretary and of W. A. Springer as treasurer, and of the appointment of J. M. Strickler as general sales manager.

Mr. Draffan began his business career with the Roycrofters, under the leadership of the late Elbert Hubbard at East Aurora, N. Y. Here he devoted himself to a study of the advertising business until the death of Mr. Hubbard, at which time he took a position in the office of the East Aurora Electric Light Company. In 1916 Mr. Draffan entered the employ of the Ohio Brass Company as assistant advertising manager. He served in this capacity until 1923 when he became assistant to E. F. Wickwire, then secretary of the company. In 1927 he was made general sales manager, a position he held until his election to the secretaryship which carries with it the duties of director of sales.



J. M. Strickler



G. L. Draffan



W. A. Springer

MR. SPRINGER ANOTHER LONG-SERVICE EMPLOYEE

Practically the whole of Mr. Springer's business life has been devoted to the Ohio Brass Company. He became a member of the Ohio Brass organization in 1912 after completing a four-year course at the Mansfield High School. His apprenticeship was served under B. F. McLean in the record department. He was next transferred to the managership of the traffic department, in which the opportunity was presented to learn much of the business in connection with his work of supervising O-B shipments to all parts of the world. For the past five years he has been assistant to the treasurer, handling, among other things, the forwarding and collecting of export shipments, and at the same time learning under the tutelage of C. V. Marks to master the intricacies of the company's finances. In this capacity he served until his recent election to the post of treasurer of the company.

At the completion of his high school career in 1906, Mr. Strickler joined the O-B company as office boy. Six months later saw him moving up the ladder. The order, traffic, hi-tension, car equipment, bond and third rail, line material, pintype insulator and general sales departments have all been stepping stones in his varied career. In 1927 he was made assistant general sales manager and now he has been made general sales manager of the organization.

Messrs. Mathias and Covert New Assistant Auditors for Westinghouse

H. N. Mathias and V. F. Covert have been elected assistant general auditors of the Westinghouse Electric & Manufacturing Company.

In rising from the ranks of the accounting department the two men took paths widely separated at first. Mr. Mathias has a service record with Westinghouse which began in 1899. Mr. Covert came to Westinghouse in 1911 from the old E.M.F. Motor Company, Detroit.

Mr. Mathias was born in Madison, Pa. After a business course in Pittsburgh he joined the Westinghouse Company. In 1908 he was made chief cost clerk. In 1917 he was made assistant to the general auditor. In 1928 he was appointed supervisor of costs and budgets. In his new post Mr. Mathias will have charge of installing standard cost and works accounting and will direct all works auditors.

Mr. Covert's first position with the Westinghouse Company was as payroll clerk. In 1917 he became assistant auditor of the Krantz Manufacturing Company, Brooklyn, a subsidiary. The same year he was sent to the Westinghouse South Philadelphia Works in charge of general accounts. In 1924 he was made works auditor in South Philadelphia. He returned to East Pittsburgh in 1926 and in 1928 he was appointed supervisor of district accounting.

W. P. Jackson in Safety Work for California Commission

W. P. Jackson has been appointed service inspector in the safety division of the California Railroad Commission in charge of inspection of mechanical and electrical equipment on electric railway systems and stages under the jurisdiction of the commission. He will work under the direction of H. L. Engelhardt, safety engineer of the commission.

Mr. Jackson has been connected with the Sacramento Northern Railway, first division, for a number of years, in charge of mechanical equipment. Prior to that he was superintendent of equipment for the Key System Transit Company, Oakland, Cal. Many years experience on electric railways throughout the country further qualify him for the work he is undertaking.

Through the establishment of a separate division of safety the commission is making a concerted effort to insure uniform safety conditions of operation and equipment on all electric railway systems and stage lines throughout California. Field inspections, it is hoped, will eliminate unsafe practices and faulty equipment among the common carriers. The division has been in existence only a little more than seven months.

✦

Personnel Changes Follow Expansion in New Jersey

Public Service Co-ordinated Transport, Newark, N. J., has made the following changes in operating personnel:

Edward D. Cone has been appointed assistant manager of the Essex division. Mr. Cone was superintendent of transportation in the Hudson division.

In the Essex division, Spencer G. Harvey, Aaron H. Hill, J. B. McCallum and George M. Klement have been named district superintendents, each to have charge of one of the four districts into which the division has now been divided.

They report to James M. Symington, manager, who will continue in general charge of the division. Mr. McCallum has charge of the northern district, which includes Big Tree carhouse, Summer Avenue garage, Miller Street carhouse, Rutherford carhouse, Harrison carhouse and Belleville Pike garage; Mr. Klement, Bloomfield district, including Montclair carhouse, Great Notch garage, Lake Street garage and Sixteenth Avenue carhouse; Mr. Harvey, Orange district, including Central Avenue carhouse, Roseville carhouse, City Line garage, Orange and Passaic Valley carhouse and Grove Street garage; and Mr. Hill, southern district, including Hilton carhouse, South Orange carhouse and Sherman Avenue garage.

The superintendents have jurisdiction over carhouses and garages in their districts. Jurisdiction over service in the territory embraced in the city of Newark is assigned to division superintendents whose lines serve it.

George A. Rothery has been appointed assistant manager, Hudson division. Mr. Rothery was manager of the company's southern division. David H. Roszel also remains as assistant manager, Hudson division.

Herbert E. Harper has been appointed manager of the southern division, and George W. Booz and Claude L. Sell have been appointed assistant managers in that division.

L. C. Bullington Appointed General Sales Supervisor

L. C. Bullington, formerly manager of the Detroit office of the Westinghouse Electric & Manufacturing Company, has been appointed general sales supervisor of that company with his office at the East Pittsburgh Works.

Mr. Bullington joined Westinghouse, Church, Kerr & Company in 1889. In 1903, when the organizations entered into a merger, he was transferred to the sales department of the Westinghouse Machine Company with his headquarters in Atlanta. Later Mr. Bullington was transferred to the Buffalo office in a similar capacity. In 1918 he went to East Pittsburgh as assistant to the manager of the power department. From that position he was promoted in June, 1922, to assistant manager of the power sales department. In 1925 he was made manager of the Cincinnati office; and in 1928 he went to the Detroit office.

✦

Curtis F. Jones Named to Louisville Board

Curtis F. Jones, employee of the Kentucky Carriers, Inc., bus subsidiary of the Louisville Railway, Louisville, Ky., has been nominated for employee-director of the railway. An employee-director has been chosen for seven years. Mr. Jones is 32 years old. He has been employed by the company for ten years. He is a veteran of the World War and was a member of the 91st Division. His brother, Wilbern T. Jones, motorman of the Broadway line, recently was awarded the Anthony J. Connelly medal and $75 as the employee rendering the most outstanding service in 1929.

✦

J. P. Potter to Head Pacific Railway Club

J. P. Potter, vice-president of the Key System Transit Company, Oakland, Cal., has been named by the nominating committee of the Pacific Railway Club for the office of president during the coming year. He is at present the club's vice-president.

Frank E. Russell, now mechanical engineer of the Southern Pacific Company, has been nominated for first vice-president, and L. L. Galbraith, a conductor for the Atchison, Topeka & Santa Fe Railway, for second vice-president. D. C. Wilkins, commercial agent of the Western Pacific Railroad Company, is the committee's nominee for treasurer. The club's election occurs March 13.

✦

W. H. Onken, Jr., Retires from the "Electrical World"

William H. Onken, Jr., for years prominent in the electrical industry as an editor of *Electrical World,* a McGraw-Hill publication, has resigned and retired from his long association with this paper. Since 1900 he has been active as a writer and editor in the electrical field. Mr. Onken began his journalistic work as a reporter on the staff of the New York *Evening Post.* Leaving this work he took a course in electrical engineering at the Brooklyn Polytechnic Institute. He came to the *American Electrician* in 1901 as an experienced reporter and writer with a definite faculty for news gathering. Later the *American Electrician,* a monthly, was consolidated with *Electrical World,* a weekly, and Mr. Onken has continued with the paper since that time as associate editor, as managing editor, as editor and more recently as senior editor.

✦

Charles J. Ellis Now with Brill

Charles J. Ellis, until recently chief engineer of the Cincinnati Car Company, Cincinnati, Ohio, has been appointed sales engineer in the electric car and truck division of the J. G. Brill Company. Mr. Ellis has a broad experience in the car-building field, dating back to 1911 when he started with the Cincinnati Car Company as a draftsman. He subsequently served in various other capacities, successively becoming chief draftsman, sales engineer and chief engineer.

✦

Harry Maze has resigned as superintendent of motor coach operations of the Union Traction Company, Anderson, Ind., to accept a position with an insurance company in Indianapolis. No successor has been named. The Union Traction Company operates more than 220 miles of bus route in Indiana.

✦

Hugh M. Tate, a lawyer of Knoxville, has been nominated by President Hoover to be a member of the Interstate Commerce Commission, to succeed Richard V. Taylor of Alabama, whose term expired Dec. 31. Mr. Tate was born in Morristown, Tenn., Sept. 15, 1882; received academic and law degrees from the University of Tennessee and began to practice law in 1903. He was judge of the Eleventh Chancery Division of Tennessee from 1918 to 1920. He is a republican.

✦

Robert M. Feustel, president of the Indiana Service Corporation, Fort Wayne, Ind., has been elected president of the Central Indiana Power Company, Indianapolis, Ind. He has been vice-president of the power company for more than a year. Samuel Insull, Jr., Chicago, who has been president, simultaneously was elected vice-chairman.

✦

Edward B. Schoultes, formerly with the Barron G. Collier service, has been engaged as an assistant to C. Melvin Sharp in charge of advertising work for the Washington Railway & Electric Company, Washington, D. C. Before accepting this position with the Washington company, Mr. Schoultes was connected with the H K Advertising Service in Washington.

✦

C. H. Quick, chief clerk of the voluntary relief department of the Interborough Rapid Transit Company, New York, for the past 23 years, has been appointed superintendent of that department to succeed the late Anson T. Berry. As chief clerk, Mr. Quick was Mr. Berry's first assistant. By virtue of his service with the company since Jan. 15, 1907. Mr. Quick is well known throughout the system.

✦

George E. Tebbetts, engineer of structures of the Chicago Rapid Transit Company, Chicago, Ill., was elected president of that company's A.E.R.A., Section No. 6 for the ensuing year at the recent meeting. He succeeds Luke Grant, manager of the publicity department, who served as president during the year just closed.

Fred K. Baker, of Everett, Wash., has been appointed director of the Department of Public Works of Washington, by Governor Hartley. He succeeds Judge J. C. Denney. Mr. Baker served for some months as supervisor of transportation. The department regulates all bus operations within the state and passes on all applications for new lines or extensions.

✦

A. R. Gardner, formerly secretary-manager of the Motor Coach Association of Washington, has resigned as head of the Department of Efficiency of the state, to become state secretary of the Savings and Loan Association.

✦

Augustine A. Bragassa, a clerk in the offices of the Lynchburg Traction & Light Company, Lynchburg, Va., since last July, has been promoted to the ways and structures department of Roanoke Railway & Electric Company. Both the Lynchburg Traction & Light Company and the Roanoke Railway & Electric Company are subsidiaries of the Central Public Service Corporation.

✦

Edgar Hymans, assistant transportation engineer of the Public Utilities Department at Cincinnati, Ohio, has resigned to become traffic manager of Ohio Bus Lines.

✦

Charles J. Heacock, Warsaw, Ind., has been named treasurer of the Winona Interurban Railroad. Mr. Heacock has been office manager of a large machinery manufacturing company of Warsaw for several years.

✦

H. Takada, general passenger agent, **M. Tsukada,** superintendent Sendai division, and **H. Yamawaki,** secretary to the vice-minister of the Japanese government-owned railroads, recently spent three days in inspecting the properties and operations of the Pacific Electric Railway in Los Angeles. The three railway officials are making an extended tour of this country and Europe in an inspection and study of steam and electric railway properties.

✦

Thomas Adams has resigned as the general director of the committee on the regional plan of New York and its environs, but will remain as an adviser to the committee which will undertake to make effective the plans designed to carry out his conception of the future city. The task Mr. Adams took up nearly seven years ago entailed the collection of basic information, the composition of a comprehensive plan which has taken form in the several volumes issued by the committee, and in communicating to the public the nature and importance of the projected changes.

✦

Herbert B. Flowers, president of New Orleans Public Service, Inc., New Orleans, La., has been re-elected chairman of the industrial bureau of the Association of Commerce of New Orleans.

✦

H. Mozley, general manager of Burnley Corporation (England) transport department for about 30 years, is retiring.

✦

A. George W. Brown, who has been research engineer of the Fifth Avenue Coach Company for the past eight years, on March 1 will become automotive engineer for the Borden's Farm Products Company.

OBITUARY

C. T. Hutchinson

Charles T. Hutchinson, president of the McGraw-Hill Company of California, died on Feb. 12, at the age of 54. Mr. Hutchinson's active association with McGraw-Hill began in April, 1922, when he came to the company from the Dewey Publishing Company of San Francisco, publishers of the *Mining and Scientific Press*. Prior to this time he had played an active and prominent part in engineering circles on the west coast.

In November, 1922, he was elected vice-president and general manager and a director of the McGraw-Hill Company of California. He also occupied the position of editorial director of the *Journal of Electricity*, now known as *Electrical West*.

On Nov. 22, 1926, he was elected president of the McGraw Hill Company of California. During the last four years Mr. Hutchinson also occupied the important



C. T. Hutchinson

position of chairman of the California Electrical Bureau.

His experience with the Joshua Hendy and the Union Iron Works gave Mr. Hutchinson a knowledge of the technique of engineering that proved invaluable during his successful participation in the publishing of engineering periodicals. To all his work, and to his play, he brought a genial sense of humor of the O. Henry kind; he was courteous, companionable, and capable. Mr. Hutchinson was widely known in literary, scientific and engineering circles, particularly on the Pacific Coast.

✦

C. P. Taft

Charles P. Taft, who died at his home on Pike Street, Cincinnati, Ohio, on Dec. 31 occupied an important place in the life of Cincinnati. His long connection with the local transportation system was fittingly recognized by the directors of the Cincinnati Street Railway in a memorial which recites the fact that while Mr. Taft's financial interest in the company was not very great compared with that in many other enterprizes with which he was identified, he had been associated in one way or another with the local transportation companies for more than a quarter of a century. He was active in the work of reorganizing these companies, and he not only retained his place as director, but kept his interest in their affairs up to the last. The progress in rehabilitating and improving the system was a source of great satisfaction to him, and he was not slow in expressing this satisfaction and giving credit to those who were responsible for doing the work. When he was able to do so, Mr. Taft visited the general offices and different parts of the property, showing his interest at all times.

✦

F. F. Bixby

Fred F. Bixby, manager of the materials department of the American Car & Foundry Company in St. Louis, Mo., died at his home in Webster Groves, Mo., on Jan. 27.

Born in Adrian, Mich., on Aug. 9, 1866, and educated in the public grade and high schools of that city, Mr. Bixby became connected with the purchasing department of the Missouri Pacific Railroad in 1882 and five years later accepted a similar position with the Texas & Pacific Railroad at Dallas, Tex. He returned to St. Louis in 1891 to join the purchasing department of the Wabash Railroad. He was made district manager for the American Car & Foundry Company in 1899 and later was transferred to the materials department.

✦

F. C. Pratt

Francis Cole Pratt, a vice-president of the General Electric Company, died on Jan. 26 in New York at the age of 63. Mr. Pratt was graduated from the Sheffield Scientific School of Yale University in 1888 and had been with the General Electric Company for about twenty years. In December, 1924, having served previously as vice-president in charge of engineering, he was appointed vice-president in charge of manufacturing, to fill the vacancy caused by the resignation of George E. Emmons. With this appointment he also assumed the chairmanship of the manufacturing committee of the General Electric

✦

T. A. McCusker

Terrance A. McCusker of the sales department of the J. G. Brill Company, died suddenly in the Jefferson Hospital, Philadelphia, on Jan. 30, Mr. McCusker, more familiarly known as "Terry" to his many associates in the electric railway industry, was born on May 3, 1874, at Philadelphia. He graduated from Girard College, Philadelphia, in 1891 and joined the Brill sales department as a stenographer on April 3 of that year. During his long connection with the Brill organization, he served in various capacities and positions of responsibility.

He possessed a remarkable memory, being steeped in the knowledge of the industry's history during his long identification with it, and quickly recalling the minutest details pertaining to the development of car design and equipment.

✦

James A. Brock, "Anderson's first citizen," is dead. Mr. Brock was 82 years old, a Civil war veteran and one of the pioneer business men of Anderson, Ind. For more than 50 years he was president of the Bank of Anderson. Mr. Brock played an important part in founding the city's water and light company and the electric railway system.

Thomas Gerehart, long connected with the Interborough Rapid Transit Company, is dead. He was 86 years old. In October, 1867, a few years after he had been honorably discharged from the Federal forces during the Civil War, Mr. Gerehart entered railroad work with the West Side & Yonkers Patented Railway. He served in the capacity of bookkeeper and paymaster and later became a conductor on the original elevated in New York. In 1878 Mr. Gerehart was appointed assistant secretary and treasurer and held this post after the Manhattan Railway acquired control. He served as claim agent of the elevated until he was promoted to be general claim agent of the Interborough Rapid Transit Company in 1905. He served in this post until 1921, when he retired.

✦

Walter Lee Frazier, superintendent of carhouses of the Cincinnati Street Railway, Cincinnati, Ohio, died at his home in Walnut Hills on Jan. 8. Mr. Frazier joined the company on Nov. 9, 1904, as general foreman of all carhouses on the western side of the city. Later he was given full charge of the company's carhouses. The remains were taken to his birthplace in Maryland for burial.

✦

A. H. Henry, formerly track superintendent of the Monroe Street Railway, Monroe, La., now the Monroe Municipal Railway, is dead.

✦

Thomas Worthington, 78 years old, for 35 years an active Wyandotte County Democrat and former chief claim agent for the Metropolitan Street Railway, predecessor of the Kansas City Public Service Company, died on Jan. 24.

✦

Alfred C. Lee, for 26 years in charge of the line work of the Indianapolis & Cincinnati Traction Company and its successor, the Indianapolis & Southeastern Railroad, died in Shelbyville, Ind., recently, at the age of 66. Mr. Lee formerly represented Shelby County in the Indiana Legislature.

✦

John F. Dinkey, 75 years old, railroader and business man, is dead. Mr. Dinkey retired on June 30, 1928, from the office of auditor and treasurer of the Buffalo, Rochester & Pittsburgh Railway. He entered the railroad industry in 1874, joined the B., R. & P. in 1881, and gave to that railroad, through its many vicissitudes, the best years of his life until his retirement. For three years he was connected with the Manhattan Elevated Railway. That was during the formative years of the company following the construction of the elevated lines in New York.

✦

E. L. Sleeper, for fifteen years personal representative of G. J. Kuhrts, president and general manager of the Los Angeles Railway, is dead. Mr. Sleeper was a native of Boston, Mass. A civil engineer by profession, he had been employed on a number of large engineering projects in the East before he went to southern California in 1908. From 1910 to 1913 he was city engineer of Pomona, Cal. In 1913 he became superintendent of construction in the outer harbor at San Pedro, a position he held until he joined the forces of the Los Angeles Railway.

INDUSTRY MARKET AND TRADE NEWS

Public Service of New Jersey Places Largest Bus Order

In order to take care of replacements, extensions and new business throughout its territory, Public Service Co-ordinated Transport, Newark, N. J., recently placed what amounts to the largest order for buses ever given by a single company. In the order, which totals 381 buses, are 211 of the gas-electric type, to be used in city service, and 170 of the gas-mechanical type for the long distance intercity routes. The city type buses will provide seats for 40 passengers, while the intercity buses will seat 30 passengers.

Of the total order 338 chassis are to be supplied by the General Motors Truck Company, Public Service building the bodies for this type in their own shops. The Mack Company is to supply ten buses of the city type and two parlor car de luxe buses, and the White Company supplies eleven buses. American Car & Foundry Motors Company's order is for twenty complete Model 40 33-passenger de luxe type buses for service on the Morris County division. These buses are equipped with Hall-Scott 120-hp. motors, are of 240-in. wheelbase, and are provided with a recently developed fresh air system of heating and ventilation. Seats are of the individual bucket type, upholstered in leather.

Features in the new buses will include the elimination of wheelhouse seats, improved ventilation facilities, exterior and interior baggage racks, sound insulator equipment, shock absorbers and balloon tires. Engine horsepower is, on the average, heavier than the present standards on the property.

Twin Coach deliveries during the month include one parlor car to the Milwaukee Electric Railway & Light Company, two 21-passenger urban type coaches to the El Paso Electric Company, and three 21-passenger urban type coaches to the Houston Electric Company. American Car & Foundries Motor Company reports the delivery of one 33-passenger urban type coach to the Poughkeepsie & Wappingers Falls Railway, and one 40-passenger gas-electric coach to the Brooklyn & Queens Transit Corporation.

Denver Tramway Company has received two White Model 65 buses. The White Company has also made delivery of four model 65 six-cylinder buses to the Community Traction Company, of Toledo, Ohio, and one bus of similar model to the Houston Electric Company.

Mack-International Motor Truck Corporation reports delivery of one Model BC 29-passenger city type bus to Denver Tramway Company, one 33-passenger city type bus to Winnipeg Electric Company, and four 29-passenger city type buses to Community Traction Company, of Toledo.

Multiple Coin Turnstile Developed

A new multiple coin device turnstile which will accept 5 and 10-cent coins or tokens through the same slot, then separate and record separately, has been brought out by the H. W. Alexander Company, automatic merchandising engineers, New York. It is now being exhibited at the Ohmer Fare Register Company display rooms, New York.

The turnstile appears of safe, sturdy construction and provides rapid, easy operation. It was designed for traction systems, subways, elevateds, steam railroads, parks, concessions and theaters. It has no electrical connections, hence meets the market demand for inexpensive apparatus to buy and to operate almost everywhere.

The turnstile will soon be in trial operation on one of the New York street cars.

Westinghouse Closes Year with Large Orders

Westinghouse Electric & Manufacturing Company entered the current year with unfilled orders approximating $65,000,000, the largest total since 1921, and more than 40 per cent greater than at the beginning of 1929. On April 1, 1928, or almost two years ago, when the company's accounting was on the fiscal year basis terminating March 31, the backlog of orders amounted to $47,742,204.

Orders booked by Westinghouse since Jan. 1, last, have also shown an upward trend compared with like period of 1929.

Westinghouse completed its best year of operations in 1929 with net income estimated in excess of $26,500,000, after all charges, or about $10 a share on 2,665,315 shares of combined preferred and common stocks outstanding. This would compare with $20,814,940 after charges, or $8.78 a share on 2,370,063 shares of combined stocks issued in 1928.

Orders booked last year were at a new high mark, approximating $240,000,000, an increase of about 24 per cent over the $193,224,000 of bookings in 1928, the previous record year. Sales billed for 1929 will also be at a new figure; they probably amounted to around $217,000,000, against $189,050,302 in 1928.

Fageol Companies Close Successful Year

In the first consolidated statement published by the Fageol Motors Company and the Fageol Motors Sales Company, Oakland, Cal., embracing the operations of the two companies, a net profit, before deduction of federal income tax, of $153,658 is reported for the year ending Dec. 31, 1929. Since this is the first statement issued in consolidated form, comparative figures for previous years are not available. Total sales during the year amounted to $3,971,858.

Ten Double-Deck Buses and 50 New Cars for Baltimore

The United Railways & Electric Company, Baltimore, Md., has ordered twelve additional double-deck buses for use on the Charles Street line. Delivery is expected within the next two months. The company also is negotiating for 50 or more new cars. These it hopes to have ready for use in the fall.

Large Order for Car Heaters

Electric heaters for the 300 subway cars for the New York Board of Transportation have been ordered from the Consolidated Car-Heating Company. The heaters are of the panel type, light weight, double coil. There are to be 28 heaters per car.

Socony Lubricants for B.-M.T.

Contracts were closed on Feb. 1 by the Standard Oil Company, New York, to provide all the lubricating products required for the subway, elevated, surface railways, buses, power stations and shops of the Brooklyn-Manhattan Transit Corporation in Greater New York.

ELECTRIC RAILWAY MATERIAL PRICES—MARCH 1, 1930

Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.00
Lead, cents per lb.	6.25
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	5.50
Tin, Straits, cents per lb.	39.00
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	42.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.35
Somerset mine run, f.o.b. mines, net ton	1.70
Pittsburgh mine run, Pittsburgh, net ton	1.50
Franklin, Ill., screenings, f.o.b. mines	1.45
Central, Ill., screenings, f.o.b. mines	.90
Kansas screenings, Kansas City	1.50

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive ⅞ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.075
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.90
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.30
Sheet iron (24 gage), cents per lb.	2.65
Sheet iron, galvanized (24 gage), cents per lb.	3.35
Galvanized barbed wire, cents per lb.	2.95
Galvanized wire, ordinary, cents per lb.	2.90

Waste—New York

Waste, wool, cents per lb.	14.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	11.00
Colored	10.00

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	14.4
White lead in oil (100 lb. keg), cents per lb.	14.25
Turpentine (bbl. lots), per gal.	0.61
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	$6.15
Weatherproof wire base, cents per lb.	18.50

Paving Materials

Paving stone, granite, 5 in., f.o.b.: New York—Grade 1, per thousand	$150.00
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.85
Gravel, ¾-in., cu.yd., delivered New York	3.40
Sand, cu.yd., delivered New York	2.15

Old Metals—New York and Chicago

Heavy copper, cents per lb.	14.75
Light copper, cents per lb.	12.50
Heavy yellow brass, cents per lb.	8.00
Zinc, old scrap, cents per lb.	2.75
Lead, cents per lb. (heavy)	4.75
Steel car axles, Chicago, net ton	$17.00
Cast iron car wheels, Chicago, gross ton	15.50
Rails (short), Chicago, gross ton	19.00
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	8.00



The Motorman's last line of defence . . .

Peacock
Reg. U. S. Pat. Office
Staffless Brakes

Are direct, emphatic, sure in action. Fast on the take up, lots of power, never clog with chain, no matter how slack the rigging may be. They stop cars when they are called into action.

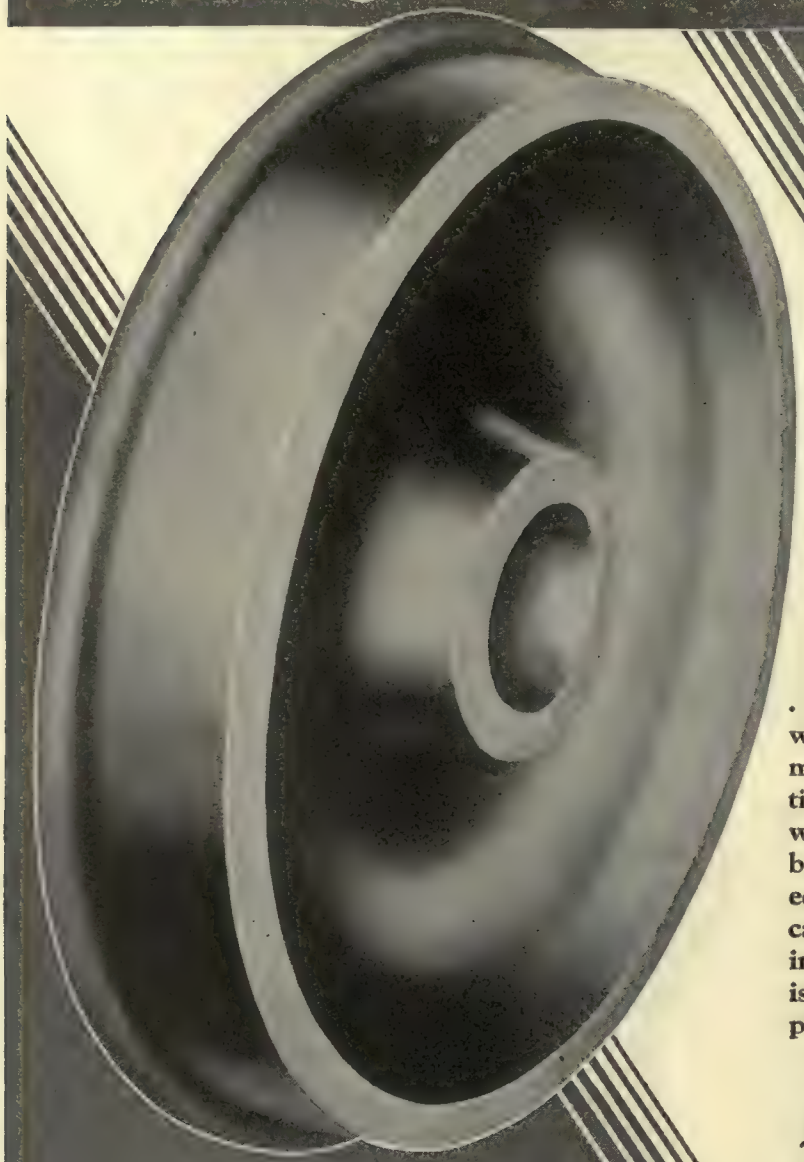


National Brake Co., Inc.
890 Ellicott Square
Buffalo, N. Y.

General Sales Office:
The Ellcon Co., 50 Church St., New York
Canadian Representative:
Lyman Tube & Supply Co., Ltd.,
Montreal, Can.

GARY

WROUGHT STEEL WHEELS





. . . . "ILLINOIS" on a wrought steel wheel is more than a mark of identification. It means a wrought steel wheel produced by the best and most modern equipment. . . . Expert supervision, careful workmanship and frequent inspection from wheel block to finished wheel all tend to produce multiplied mileage at low cost.

Our Wheel Engineers are at your service.

Illinois Steel Company

Subsidiary of United States Steel Corporation

General Offices:

208 South La Salle Street .. Chicago

ALL THAT GOOD WHEELS SHOULD BE



A Comfortable, Sanitary and Modern Seat!

HERE is a seat which maintenance engineers will appreciate. Its close-woven cane webbing back and cushion are easy to keep clean. The genuine leather facing on the cushion reinforces the seat at the greatest point of wear. In addition, the individual backs and deep, spring cushions are shaped to allow proper posture and leg freedom. Mechanism rails are set in and the frame of the chair is made of selected Northern hard-grained ash, further strengthened by malleable iron braces. Write to the nearest Heywood-Wakefield sales office for complete details of the 327-M Special and other popular bus and electric railway seats in our line.



If you have not received a copy of our new Bus Seat Catalogue, write for it.

HEYWOOD - WAKEFIELD COMPANY

BOSTON, MASSACHUSETTS

516 West 34th St., New York City
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
439 Railway Exchange Bldg., Chicago, Ill.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
The G. F. Cotter Supply Co., Houston, Texas
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

BETTER PERFORMANCE for Truck or Tractor



Industrial tires that cut costs

ONLY the most painstaking analysis,—careful study of actual conditions under which industrial tires are operated,—made it possible for Firestone to design and produce exactly the RIGHT tires for trucks and tractors. Smooth, easy rolling for small current consumption. The toughest rubber known for long, even wear. Positive traction. And underneath a base capable of long, continued abuse or overload to which most trucks are so frequently subjected. It will pay you to equip your trucks or tractors with Firestone Solid Industrial Tires. Write or call the nearest Firestone Branch today for full information.



Firestone

Copyright 1930—The Firestone Tire & Rubber Co.

A Million Dollars . . . a Day!

More Than 113,000 Cars and Buses Continuously Operating Over 70,000 Miles of Track and Bus routes

That's what wears out units and uses up materials and supplies so fast that electric railways must spend more than a million dollars a day this year for maintenance, betterments and extensions.

Fourteen millions more than last year . . . 28 millions more than the year before.

That's what necessitates repair shops resembling modern factories . . . in size and equipment.

That's why maintenance executives find *Electric Railway Journal* so interesting and helpful, particularly the Annual Maintenance and Construction Number published each year in April.

And that's why advertisers find that April issue such a splendid medium for reaching this big . . . and growing . . . market.

THE

ANNUAL MAINTENANCE NUMBER

of *Electric Railway Journal*

APRIL ISSUE

Advertising Forms Close March 19th

Aimed at the source



THE TIMKEN-DETROIT

of bigger revenue

There's one sensible, sure-fire way to attract and hold more riders—give them quiet, smooth, fast, dependable transportation; the kind of riding made possible by Timken Worm Drive.

LESS NOISE
LESS WEIGHT
FASTER SCHEDULES
LOWER POWER CONSUMPTION
LOWER COSTS OF MAINTAINING
TRACK AND EQUIPMENT

these are the benefits that come hand-in-hand with

TIMKEN *worm drive* TRUCKS

for electric railway cars



AXLE CO., DETROIT, MICH.

SEVEN MORE MACKS
FOR THE
PENINSULA TRANSIT CORPORATION

Virginia's largest bus operator studies them all, and again repeats on Macks

Mack



For five years, from 1919 to 1925, Peninsula plugged along with mediocre equipment.

But in 1925, the initial purchase of 4 Model AB Macks marked the turning point in the company's career. Improved equipment resulted in more satisfied passengers. Revenue figures began to climb. Soon, old routes were extended and new routes established. In each case, additional Macks were purchased.

In 1929, Peninsula secured the franchise for through-schedule service from Norfolk to Richmond—a 92 mile run. For this, its newest and longest route, the company wanted nothing but the most modern equipment available. For weeks, various makes of buses were rigidly tested and studied from every angle.

And in the end, Mack was again the choice. Seven Mack Model BK six cylinder buses for long distance service were purchased, bringing the company's total to 24. Past judgment had been confirmed by this latest analysis.

Some of the comfort features of these completely Mack-built buses

Full view windows — non-shatterable glass.

Pneumatic shock absorbers.

Mack rubber shock insulation.

Reclining chairs — head rests and leather air cushions.

Electric fans—hot water heating.

Thermos ice water containers.

Pullman card tables.

MACK TRUCKS, INC.

25 Broadway, New York, N. Y.



An "on time" record



CITIES SERVICE OILS

ONCE - ALWAYS

THE 64 motorcoaches of the County Transportation Co., Inc., in Westchester County, New York, were operated 2,388,869 miles in 1929, with an "on time" percentage for the year of 99.90 per cent. This remarkable record on 237,347 trips through the crowded thoroughfares of New York City's most congested suburban territory reflects the remarkable efficiency of this Company's operation in which scientific Cities Service lubrication plus the use of powerful, clean burning Cities Service gasoline plays an important part.

This same scientific Cities Service lubrication is available to bus properties throughout the country.

CITIES SERVICE COMPANY

60 Wall Street — New York City

KOOLMOTOR PRODUCTS



over 2,388,869 bus miles



Company:
County Transportation Co., Inc.

Number of Vehicles: 64

Yearly Bus Mileage: 2,388,869

Number of Trips: 237,347

Cities Service Products Use:

Cities Service Gasoline
Koolmotor Bus Oil XX
Koolmotor Transmission Oil (Heavy)
Koolmotor Universal Grease (Heavy)
Cities Service Grease Guns



Much longer



Less wear at the point of rail contact means more service and reduced maintenance costs.

Longer life . . . greater mileage dependability—

All valuable points in modern car operation.

Makers of
Simplex Multiple Unit Clasp Brakes

AMERICAN
NEW YORK

wear here—

less time in the shop

DAVIS
One Wear
STEEL WHEELS

FLATS and shellouts cost money. They are a burden on revenue.

Such a situation is an unnecessary one. It is easily solved.

Davis "one-wear" steel wheels stay in service and out of the shop. The secret is in the material used in their manufacture. It is a special heat-treated composition steel . . . slow wearing and never needs re-turning.

Davis "one-wear" steel wheels have three outstanding qualities worth your investigation. They are: wear resistance,—strength,—lightness.

Eliminate the wheel re-turning items from your maintenance.



STEEL FOUNDRIES
CHICAGO ST. LOUIS

ASF



WHY CONSIDER THE COST OF LUBRICANTS?

ELECTRIC railway lubrication practices are changing. A new system of car lubrication has been developed and has effected striking economies.

Operating engineers now realize more than ever before that the cost of lubricants per gallon or per pound is such a negligible factor that it is entirely unimportant as compared to the possible savings in power, waste consumption, labor for repacking bearings, elimination of hot boxes and reduced bearing and journal maintenance cost. It is a new view point.

The Texas Company, always a leader in providing better lubricants and lubrication practices, has been foremost in bringing this about.

The Texaco System of Lubrication, of which Texaco Lovis Oil and the Texaco Oil Seals are important elements, has demonstrated conclusively that power consumption and maintenance cost per car-mile can be substantially reduced. Write The Texas Company for the facts. A Texaco Engineer will gladly give you full details—or arrange for any desired test on your own lines.

TEXACO
REG. U.S. PAT. OFF.

TEXACO

The Texas Company, 17 Battery Place, New York City

OFFICES IN PRINCIPAL CITIES

LUBRICANTS



GOODYEARS

meet the trains and boats

IN NEW ORLEANS

Between five railroad stations and steamship wharves, the New Orleans Transfer, Inc., move passengers and baggage. They are the contract agents for all railroad and steamship companies, and they have a 57 year reputation to maintain.

On the whole fleet of this company, Goodyears have been the only tires used for several years. They supply the sure-footed traction which safety of passengers demands, they have the dependability needed to run a fleet rigidly on schedule. More tons are hauled on Goodyear Tires than on any other kind, and scores of experiences like this serve to emphasize the reason. Let a Goodyear Truck Tire Service Station Dealer recommend the right type and size of Goodyears to meet your needs with greatest economy.

ON YOUR NEW BUSES SPECIFY GOODYEARS

GOODYEAR

MORE PEOPLE RIDE ON GOODYEAR TIRES THAN ON ANY OTHER KIND



338

more YELLOWS for Public Service Coordinated Transport

. . . the 12th order for Yellow Coach from one of America's largest bus operators.

. . . the largest single order ever placed for coaches with an American manufacturer.

PUBLIC SERVICE NJ YELLOW COACH

. . . this order brings the total number of Yellows owned and operated by the Public Service Coordinated Transport to

*1762

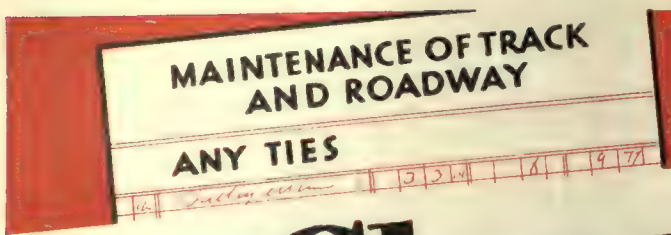
—*the largest standardized fleet of coaches in America.*

. . . and not one Yellow Coach has ever been retired from active service.

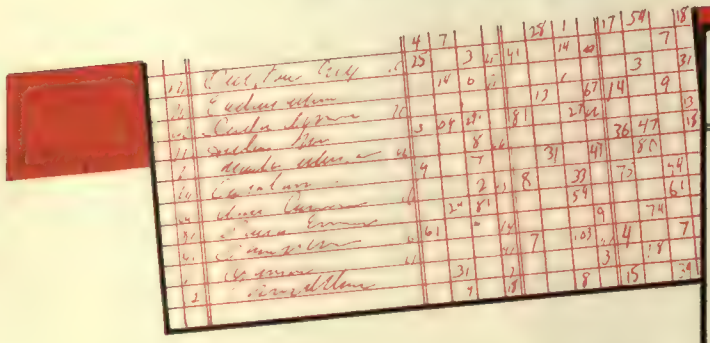
The big new Yellow 150 Horsepower 616 engine will be used in each of the 338 coaches ordered and 160 of the coaches will be equipped with 40-passenger bodies. This order was placed on the strength of *known performance* of Yellow Coaches operated by the Public Service Transport. It is its eleventh repeat order since 1924, when the first Yellow went into the service of this operator.



YELLOW COACHES



A Clean Sheet— ... eliminate your



MAINTENANCE OF TRACK AND ROADWAY

DAYTON TIES

Transfer to Profits!

STARTLING . . . yes, and true. Facts and figures gathered from seventeen years of actual installation under all conditions of traffic have proved conclusively that tracks using Dayton Ties require no major maintenance at all. Think what it would mean to your property if you could deduct the greater part of your maintenance of track and roadway account from your operating expenses. It would perhaps mean the difference between red and black, in many cases. Certainly it would mean a far greater return on your investment than is possible where expense of maintenance is out of all proportion to operating expenses. And *remember this . . . Dayton Ties can be installed more cheaply than the cheapest track you ever built.* Progressive engineers who are ready to accept only proven facts are invited to write for full information regarding DAYTON TIES.

★ VIBROLITION

A coined word denoting demolition of rail substructure through rail vibration. Dayton Ties prevent VIBROLITION.

"The Better Tie

THE DAYTON INTEGRAL SYSTEM OF

THE DAYTON MECHANICAL

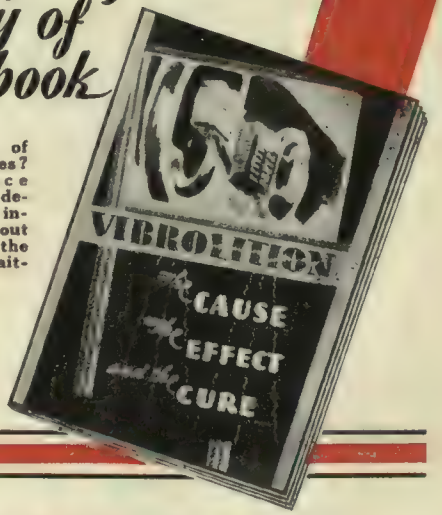
for your ledger! track maintenance



Dayton Ties recognize the fundamental law that you cannot hold a vibrating steel rail in a concrete structure without inviting its destruction under the vibration of traffic unless you protect the concrete from this force. And because Dayton Ties incorporate this exclusive vibration absorption element . . . in seventeen years they have yet to show the slightest failure under every conceivable condition of traffic.

Send for your copy of this book

What is this disease of modern track structures? Every maintenance engineer knows its destructive effect. This interesting book brings out the facts and points the cure. Your copy is waiting.



Without An Alibi"

TRACK AND PAVING STRUCTURE

TIE CO.,~DAYTON, OHIO



BOOKS PADS STRIPS

INCREASED Revenue possibilities of tickets in books, pads and strips are:

1. Attractive price to the public, yet *limited riding privileges;*
2. Faster collection and less change making;
3. Guarantee a definite number of rides which the auto will not get;
4. Secure money in advance;
5. Spent more readily than money;
6. Salable advertising space on covers and backs.

We recommend the 25/32 ticket size. It saves stock and 125 lbs. shipping weight per million, makes a small book that fits the pocket or handbag safely, does not fill up small fare boxes on long runs, and costs less per thousand in large lots.

Which style shall we send?

Write Nearest Office

Factories	*Offices*
Philadelphia	Syracuse
Los Angeles	Baltimore
Boston	Cincinnati
New York	Cleveland
Jacksonville	Pittsburgh
	Springfield, Mass.

Globe
TICKET COMPANY
112 North Twelfth Street
PHILADELPHIA

Now Available—

this 38 passenger City Service Coach

with the new Yellow 150 hp. engine. Capacity to handle maximum peak loads, meet difficult grade or traffic conditions, maintain fast schedules

with practically no increase in fuel consumption over engines of smaller displacement

with many new chassis improvements

with the safest, surest trouble free brakes ever developed for bus use, air operated

and

with entirely new type bodies of all-metal construction

with a service life equal to that of the chassis

with comfortable seats for 38 passengers or without rear exit door 40 passengers

with quick loading and unloading thru front and rear air operated doors

plus all the time proven, dependable qualities that have made Yellow Z models so popular in city service everywhere



New Type Bodies of All-Metal Construction (see next two pages)

Wheelbase 250 inches

616 Yellow overhead valve 6 cyl. 150 hp. engine

Rigid Z type frame with tubular cross members

Air operated clutch

4-speed transmission amidship

Full floating worm drive rear axle

4-wheel service brakes, air controlled with gun iron drums and easily removable brake liners

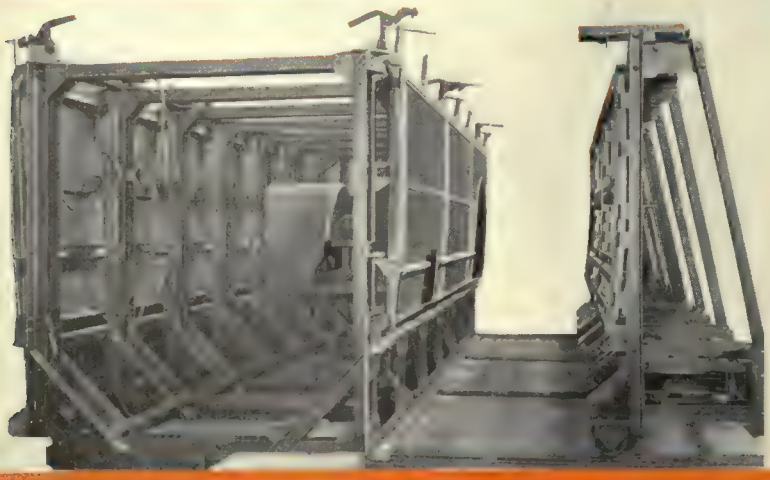
Balloon tires 40 x 9.75

Optional, Yellow Knight sleeve valve 100 hp. 6 cyl. engine

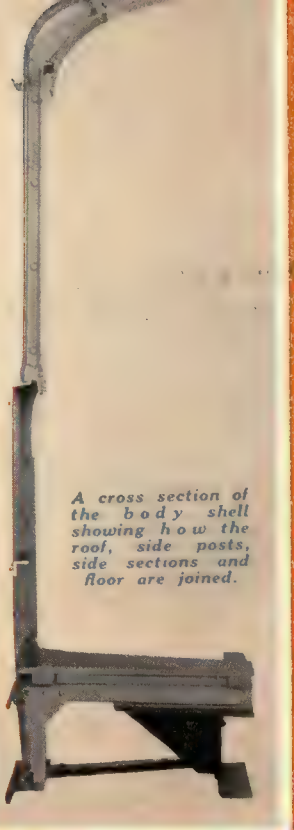


YELLOW

38 Passenger TYPE Z



Assembling a side section in a special erection jig. The side panels are of pyrmetl.

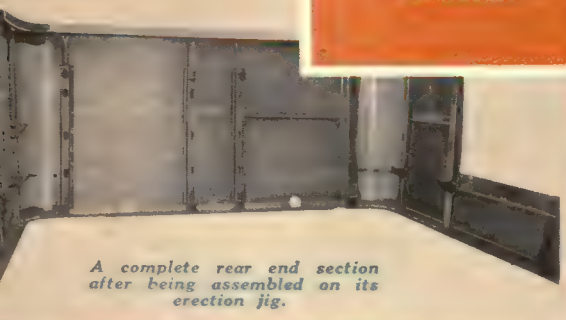


A cross section of the body shell showing how the roof, side posts, side sections and floor are joined.



Assembling the body shell. Side sections, ends and roof are assembled over a fixture.

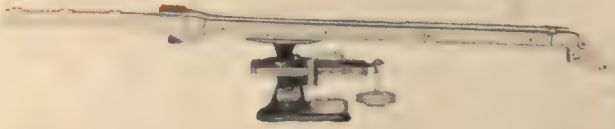
Assembling the roo side posts in a s erection jig. The posts will join the section at the bel



A complete rear end section after being assembled on its erection jig.



A side post weighs 7 lbs. 8 oz. It is of forged duralumin; interchangeable with other posts in the body.





New Type All-Metal Bodies

More substantial, remarkably light, longer service life, simpler and more economical to maintain. Standard on the Z29 and Z38

The new all-metal coach bodies developed by General Motors Truck are now in regular standardized production. They represent a truly outstanding development both in the art of modern coach body engineering and in efficiency of manufacturing method.

For these coach bodies are of (1) rigid all-metal construction (chiefly duralumin and other aluminum alloys) (2) remarkably light in weight, yet (3) amazingly strong, with (4) a service life equal to that of the chassis. And like the chassis, these bodies are (5) precision built of standardized parts and sections which not only fit as accurately as the chassis parts, but (6) are just as easy to stock and renew. Yet with all these advantages it (7) costs no more than you would expect to pay for any well-built body.

Advanced engineering plus modern day principles of mass production are responsible for this important achievement.

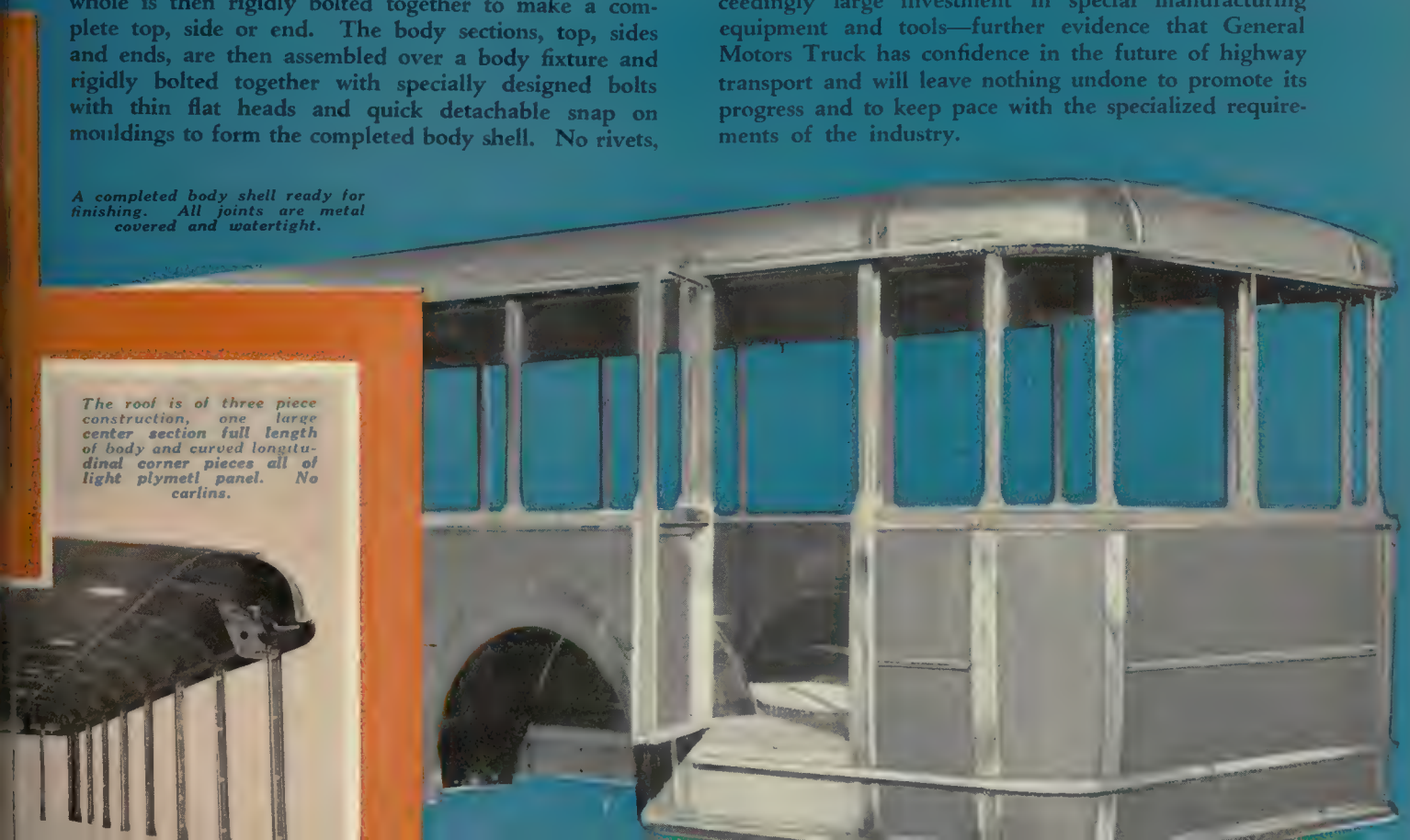
The body shell consists of six major all-metal sections; a top, two sides, a rear, a front and a floor frame. Each section in turn is made up of smaller standardized body units. Each of these units is formed and assembled over precision jigs and fixtures from die-cut, drop forged or machine-shaped metal parts. Absolute precision of fit such as is found in the building of chassis parts prevails from the first manufacturing step to the last. As the small body parts come from the big machines cut, shaped or forged to a micrometer fit they are assembled over precision jigs and fixtures to make a body unit. These standard body units are next assembled over a master erection jig which draws each body unit under pressure into accurate position and alignment and the whole is then rigidly bolted together to make a complete top, side or end. The body sections, top, sides and ends, are then assembled over a body fixture and rigidly bolted together with specially designed bolts with thin flat heads and quick detachable snap on mouldings to form the completed body shell. No rivets, no wood, no hand cutting, no fitting. An all-metal, mass production job with avoidable labor operations eliminated and with manufacturing costs reduced to a minimum.

Because duralumin or other aluminum alloys are used wherever practical, the body is amazingly light. A lighter body means that heavier revenue loads can be substituted without increasing tire or gasoline costs. Being of all-metal construction it is exceedingly strong and enduring. It is fire resisting and safer. It contains no wood and will last longer. Its rigid metal construction successfully resists weaving, rattles and squeaks. It has much thinner wall sections and consequently provides more body and revenue area for a given over-all body width. The slender side posts of forged duralumin are much stronger than wood and have less bulk, providing greater window area and vision for passengers standing or seated.

Maintenance is greatly simplified. For the first time, standard body parts and sections are available that fit as accurately and easily as chassis parts. The number of different body parts has been greatly reduced; many are interchangeable and inventory requirements have accordingly been greatly reduced. In case of accident, damaged body parts, units or sections can be quickly and cheaply removed and replaced with unskilled labor. Because flat head bolts instead of rivets are used throughout, the work of replacing damaged parts has been facilitated and greatly simplified. There is no need for costly, time consuming hand fitting, shaping or riveting.

To make possible the many economic advantages of this new type all-metal body has necessitated an exceedingly large investment in special manufacturing equipment and tools—further evidence that General Motors Truck has confidence in the future of highway transport and will leave nothing undone to promote its progress and to keep pace with the specialized requirements of the industry.

A completed body shell ready for finishing. All joints are metal covered and watertight.



The roof is of three piece construction, one large center section full length of body and curved longitudinal corner pieces all of light plymetl panel. No carlins.

A New Z 29!



Body. All-metal construction

Wheelbase. 225 inches.

Engine. 110 horsepower 6 cyl. Yellow Knight

Frame. Rigid Z type with tubular cross members

Clutch. Manually operated

Transmission. 4-speed amidship

Axle. Full floating worm drive

Service brakes. 4-wheel air controlled with gun iron drums and easily removable brake liners

Dual fuel feed system

Tires. Balloon 40 x 9.00

Optional, 616 Yellow overhead valve 150 horsepower engine

Type Z, nationally famous for its years of dependable and economical performance on many of America's largest city operations is now available with many new and noteworthy improvements.

The wheelbase has been lengthened to 225 inches to make more room for the larger but lighter bodies of all-metal construction recently developed by Yellow and described on the preceding pages.

This new body in addition to its many other unequalled advantages makes possible an unusually liberal seat spacing (31 inches) to provide a maximum of comfort for 29 seated passengers, or as an alternative arrangement this body is available with a rear treadle door and seats for 29 passengers or without treadle door and seats for 31 passengers.

Other improvements are greatly improved riding qualities, 4-wheel service air brakes, balloon tires and many other chassis refinements. The total weight has been reduced resulting in more effective power and greater economy.

In addition to the worthwhile improvements that have been built into this popular city service model its dependable performance characteristics, low maintenance cost and high earning power has been rigidly maintained.

GENERAL MOTORS TRUCK COMPANY, *Pontiac, Michigan*
Subsidiary of Yellow Truck and Coach Manufacturing Company



29 Passenger TYPE Z

YELLOW



"Brrrrr! . . . thank goodness, there's a warm-looking bus"

Brightly lighted motor coach promises warm, comfortable ride . . . attracts patrons

A COMFORTABLE ride means more than good springs. On these cold nights it means passengers can relax in a warm, cheery, brightly lighted interior . . . and read their papers with ease and comfort.

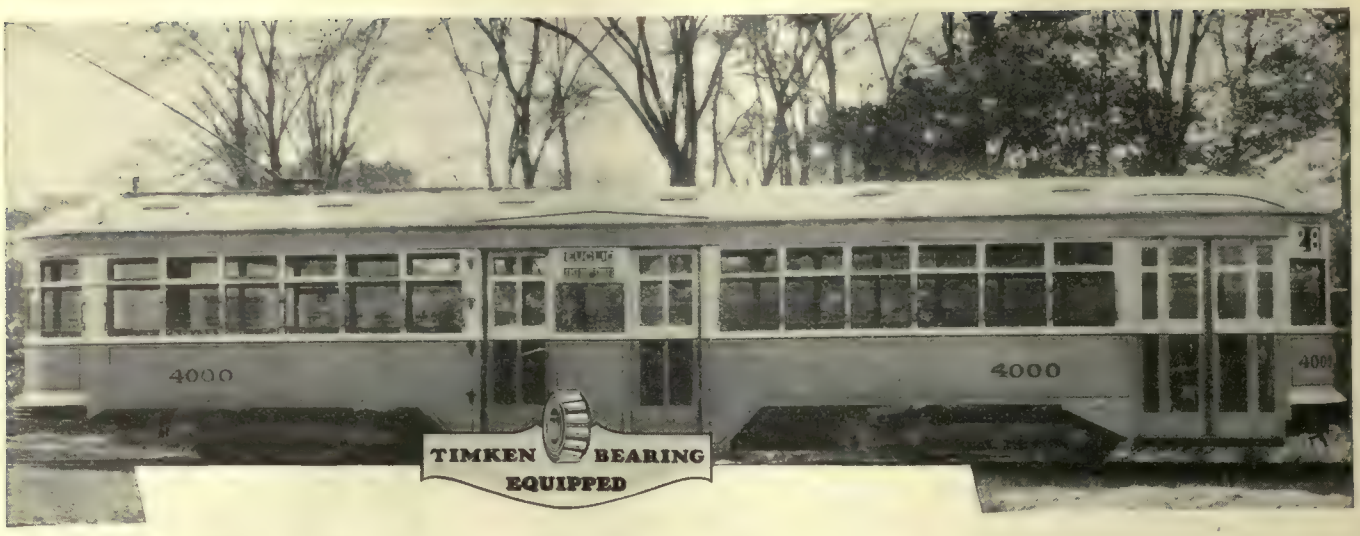
Modern coaches require modern lighting. Running lights must be powerful and well-focused . . . to stab the darkness and reveal curve and danger spot. Interior lamps must be bright and well-placed . . . to give fares reading comfort, to make their ride seem shorter. And the coaches that offer these get the business.

To insure proper lighting an adequate power plant is vital . . . a generator of the right capacity, backed by a dependable storage battery. You will find that scores of successful motor coach operators have chosen Exide Motor Coach Batteries as standard equipment for their fleets.

Exide Batteries are specially designed for their jobs. They are built by the world's largest manufacturers of storage batteries for every purpose and planned by skilled engineers. You can be confident that every Exide Battery will do its duty steadily, dependably and economically. Write for information on specially designed battery for motor coach service.

Exide
MOTOR COACH BATTERY

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE
Exide Batteries of Canada, Limited, Toronto



The Cleveland Railway Company Increases Its Timkenized Car Equipment 129% In One Year





Profitable operation of electric railway systems is largely a matter of keeping public patronage up and operating costs down.

Timken Bearing-Equipped cars are helping to do both by wiping out wear and waste and increasing passenger convenience and comfort.





The Cleveland Railway Company is one of the progressive street car organizations that are profiting by Timken benefits.

This company placed its first order for 78 Kuhlman-Brill Timken-equipped cars in 1928. In the latter part of 1929, 100 additional cars were ordered, bringing the total up to 178 cars, and representing an increase of 129% in one year.





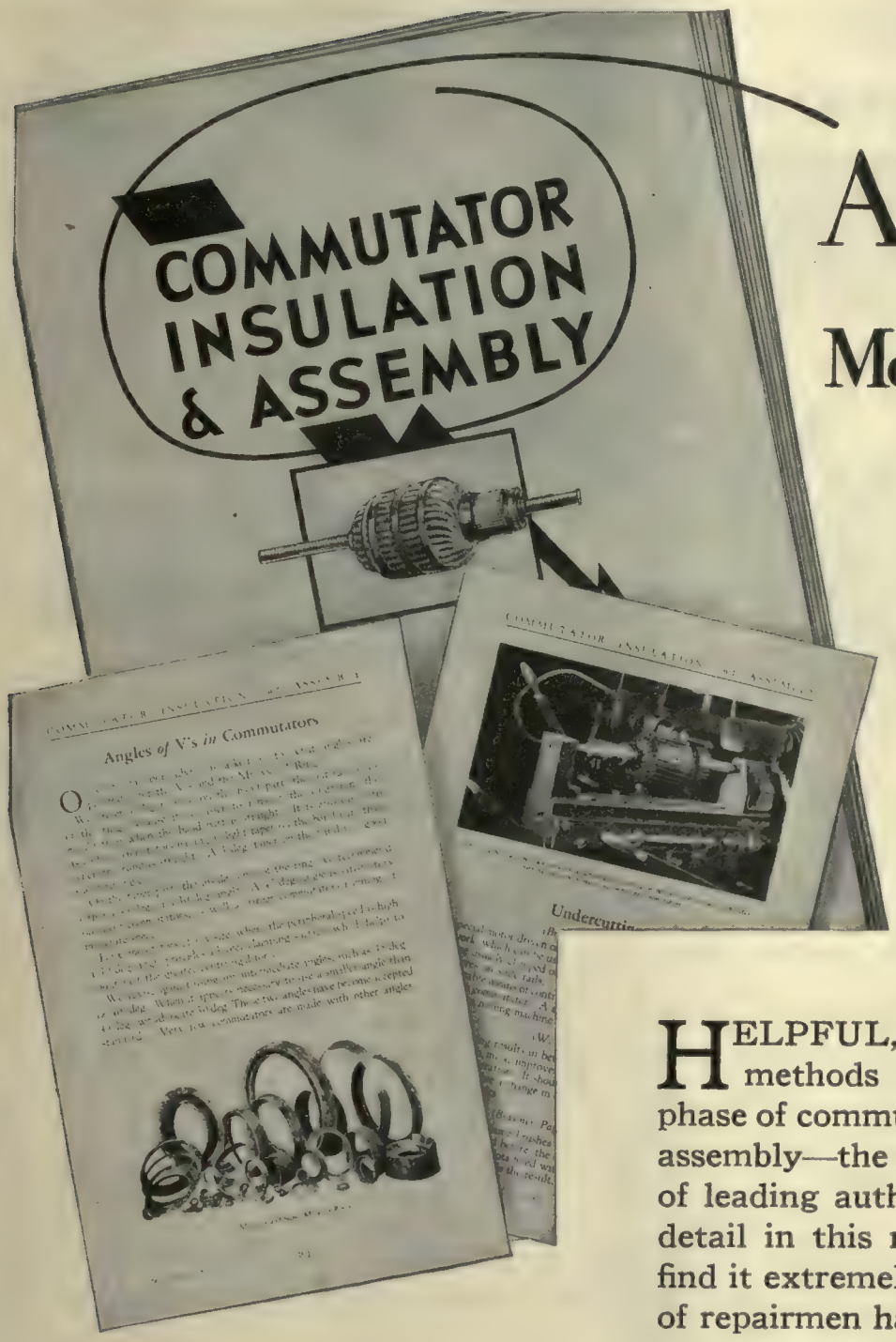
Easier, jerkless starting and smoother running distinguish cars with Timken-equipped journals. The drastic reduction of frictional load substantially lowers the power demand and saves lubricant. Wear is held in leash. Maintenance costs sink to new low levels.

And with these advantages there is the nullification of radial-thrust loads, cancellation of out-of-service charges due to plain bearing maintenance and the extension of truck life ... through the exclusive combination of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel.

THE TIMKEN ROLLER BEARING COMPANY
C A N T O N , O H I O

TIMKEN *Tapered Roller* **BEARINGS**





A new book of Modern practice — Yours for the asking

HELPFUL, practical facts and methods dealing with every phase of commutator insulation and assembly—the consensus of opinion of leading authorities—all given in detail in this new book. You will find it extremely useful—thousands of repairmen have. A copy is yours for the asking.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.

Cleveland Pittsburgh Cincinnati Birmingham Seattle San Francisco
Los Angeles Toronto Montreal *Works:* Schenectady, N.Y. London, Eng.

PERFECT MICANITE INSULATOR REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION

Another Development by LORAIN



THE DIXON TONGUE SWITCH

Lorain

GIRDER RAILS
GIRDER GUARD RAILS
PLAIN GIRDER RAILS
RAIL JOINTS AND TRACK ACCESSORIES
EXPANSION JOINTS FOR ELECTRICALLY WELDED TRACK
SPECIAL TRACKWORK
SWITCHES, FROGS AND CROSSINGS
in
Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail.

DURING the past 40 years, the name LORAIN has been identified with many important developments in track equipment. The Dixon Tongue Switch—developed by LORAIN—is a solid casting of manganese steel. In addition to the Tadpole Heel feature, the Tongue is held in place by means of the Heel Plate which is provided with a raised floor to carry the car wheels on their flanges over the tongue heel. This eliminates the usual pounding of wheel tread on heel of tongue in the trailing position.

The Heel Plate is made of heat-treated cast chrome nickel steel, which facilitates the building up of floor by electro-deposit welding. The hold-down bolts and nuts are sealed with asphaltum to exclude moisture. *Write our nearest District Sales Office for quotation.*

THE LORAIN STEEL COMPANY
JOHNSTOWN, PA.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

American Bridge Company
American Sheet and Tin Plate Company
American Steel and Wire Company
Carnegie Steel Company
Cyclone Fence Company
Federal Shipbuilding and Dry Dock Company
Illinois Steel Company
Minnesota Steel Company
National Tube Company
The Lorain Steel Company
Tennessee Coal, Iron & R. R. Company
Universal Portland Cement Company

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

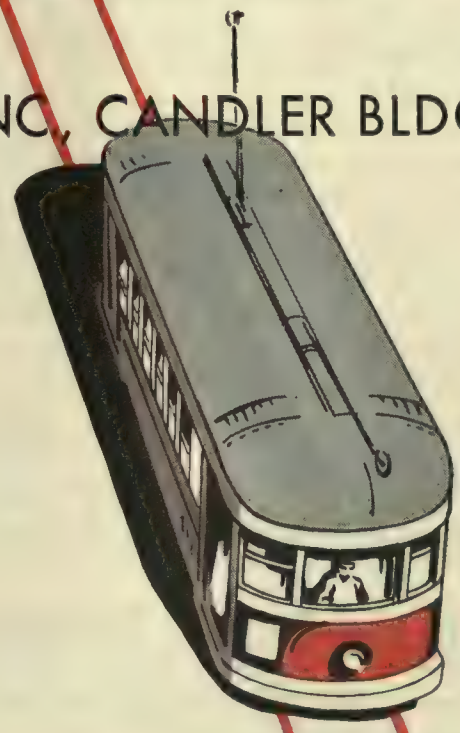
Lorain Sales Offices—ATLANTA CHICAGO CLEVELAND DALLAS NEW YORK PHILADELPHIA PITTSBURGH



FOR more than forty years street car riders have made good use of the service rendered by the Collier car cards in the fulfillment of their daily wants. This is confirmed by the fact that successful merchants and manufacturers are consistent users of street car advertising as an assured means of increasing business.

Since the car cards are really useful to the daily riders, they become, in effect, a part of the electric railway service. And so, in proportion, they assume a value to the electric railway company above and beyond the fact that they are a reliable source of income.

BARRON G. COLLIER INC., CANDLER BLDG., N. Y. C.



"CAR CARD ADVERTISING ALMOST EVERYWHERE"



NATIONAL
SHELBY
TROLLEY POLES
Minimum weight with maximum strength

TO keep daily service at the highest peak of efficiency means the elimination of delays or traffic tie-ups frequently caused by trolley poles failing to hold up in service. Reliable poles, therefore, are a good investment. Their selection should be based on design and tests that prove their fitness for the character of service in which they will be used.

NATIONAL-SHELBY Poles are designed with sufficient strength to meet all service requirements and yet not be of excessive weight. A special form of reinforcement at the proper place gives the pole great strength while the grade of steel used and a special heat treatment after drawing gives a high elastic limit and assures long life and satisfactory service.

In addition, every NATIONAL-SHELBY Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. This type of test is especially important in that it minimizes the possibility of any defective pole being installed—thereby helping to cut the cost of trolley pole service before it begins. A description of this test and complete information about these poles will be sent on request.

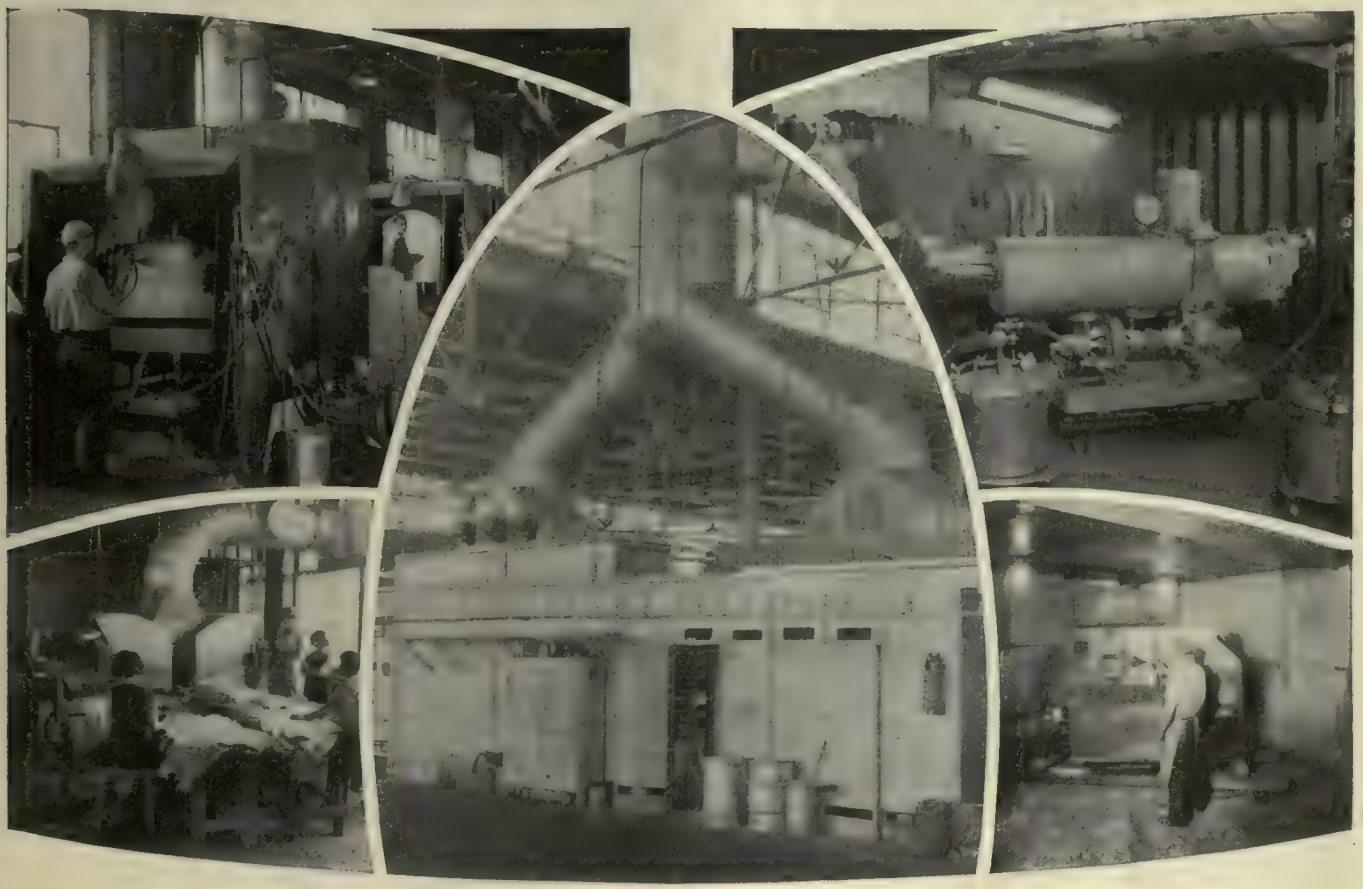
NATIONAL TUBE COMPANY
Frick Building, Pittsburgh, Pa.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL PORTLAND CEMENT COMPANY

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

» » » FOR ALL REQUIREMENTS OF ALL SPRAY PAINTING OPERATIONS



THE most efficient and economical spray-painting and spray-finishing equipment is that which embodies in the specialized outfit or installation for a particular industry, the most advanced knowledge gained in the service of all industries.

DeVilbiss spray outfits for finishing and finish maintenance of motor and electric transport units are made and installed especially for the place in which they are used and the methods employed by the user. And they also include efficiencies which can come only from a vast experience under widely varied conditions in the many industries where painting and finishing are parts of production or maintenance processes.

Your painting, finishing or ventilating problems may be peculiar to your own methods, materials and arrangements, but you will find that DeVilbiss has the equipment and the experience that assure the maximum advantages to you.

DeVilbiss engineers are working far in advance of the usual requirements of manufacturing and maintenance finish operations. Those who come to DeVilbiss obtain immediately the knowledge and the equipment which otherwise they would reach only through long and often costly experiment. It costs you nothing to learn what we can do for you.

Look to DeVilbiss for Modernized

Spray guns of various types and sizes.
Pressure feed paint tanks and containers.
Spray booths, exhaust fans, and approved lighting fixtures.
Air compressing equipment.
Air transformers and accessories.
Air and fluid hose and connections.
Complete outfits from the smallest hand-operated units to the largest industrial installations.

DeVilbiss Spray-PAINTING FINISHING System

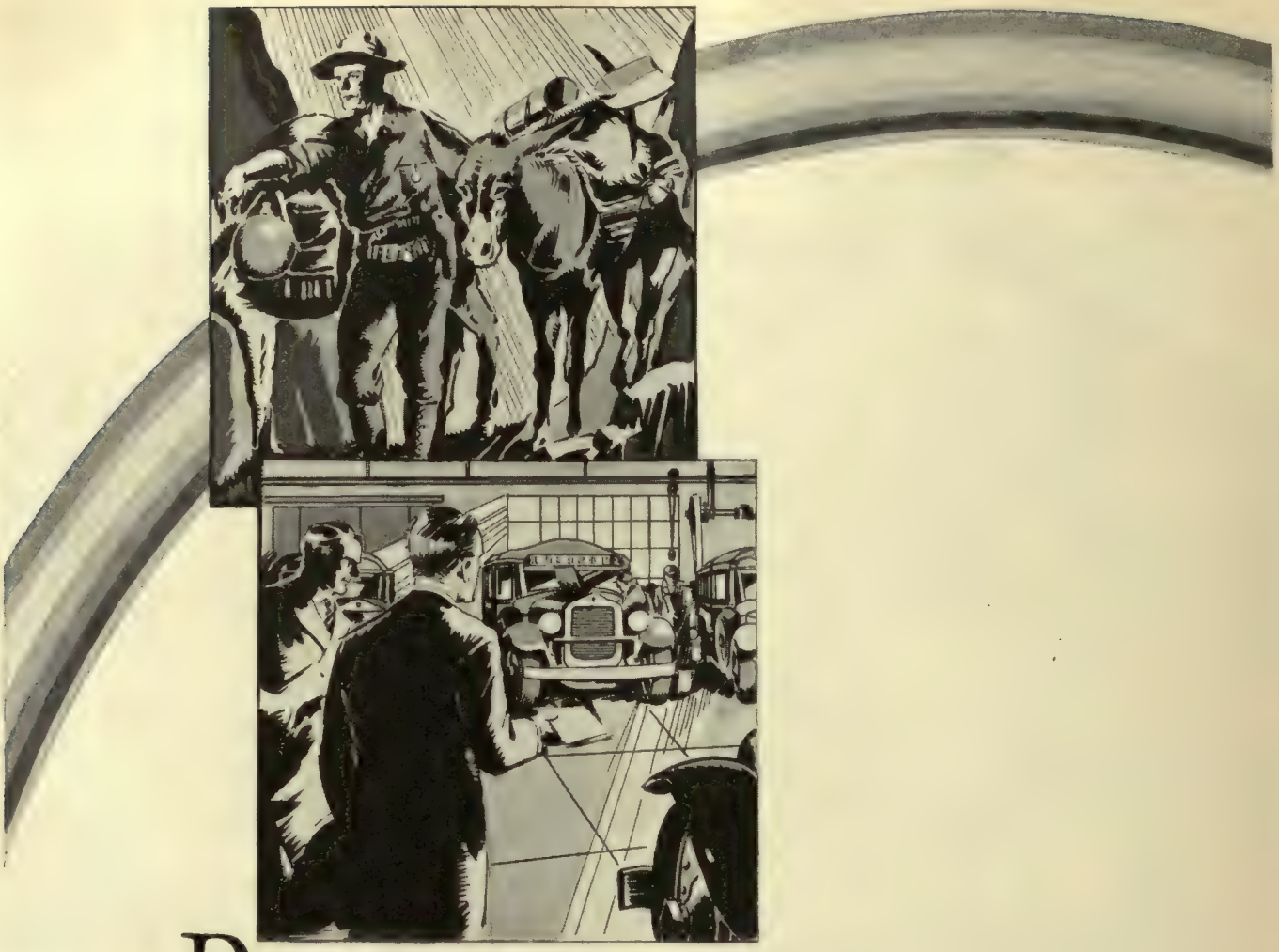
THE DeVILBISS COMPANY

272 Phillips Ave., Toledo, Ohio

Sales and Service Branches

New York Philadelphia Cleveland Detroit Indianapolis Chicago St. Louis San Francisco Los Angeles Windsor, Ont.

Direct factory representatives in all other territories



Prospectors of 1930 find nuggets under the hood

Nearly a century ago, a rainbow flashed across the American skies, arching down into the newly discovered pot of gold in Sunny California. Later the rainbow moved behind Chilkoot Pass and lured hardy, eager men to the Yukon country. Again it was the Transvaal . . . South America . . . Australia.

Today, the prospector of old has become a symbol of a bygone era. But 1930 has his counterpart . . . and needs his tireless spirit. The prospector of 1930 is uncovering hidden sources of profit in the operation of his busses . . . is achieving ways to increase net earnings even when gross operating income remains stationary.

For such men, the engineers of the Shell Petroleum Corporation have a message, a promise of help through the introduction of Shell *Applied Lubrication*. These engineers are at your command. If you feel the need for skilled counsel to help you eliminate losses due to less-than-100% lubrication, please feel free to call on the Shell specialists. There is no cost or obligation in a frank talk with them. And they will gladly come in response to a 'phone call or a letter directed to the nearest Shell office. Shell Petroleum Corporation, Shell Building . . . St. Louis.

SHELL

Applied Lubrication

©S. P. C., 1930

150,000 miles over mountainous roads without overhauling . . .



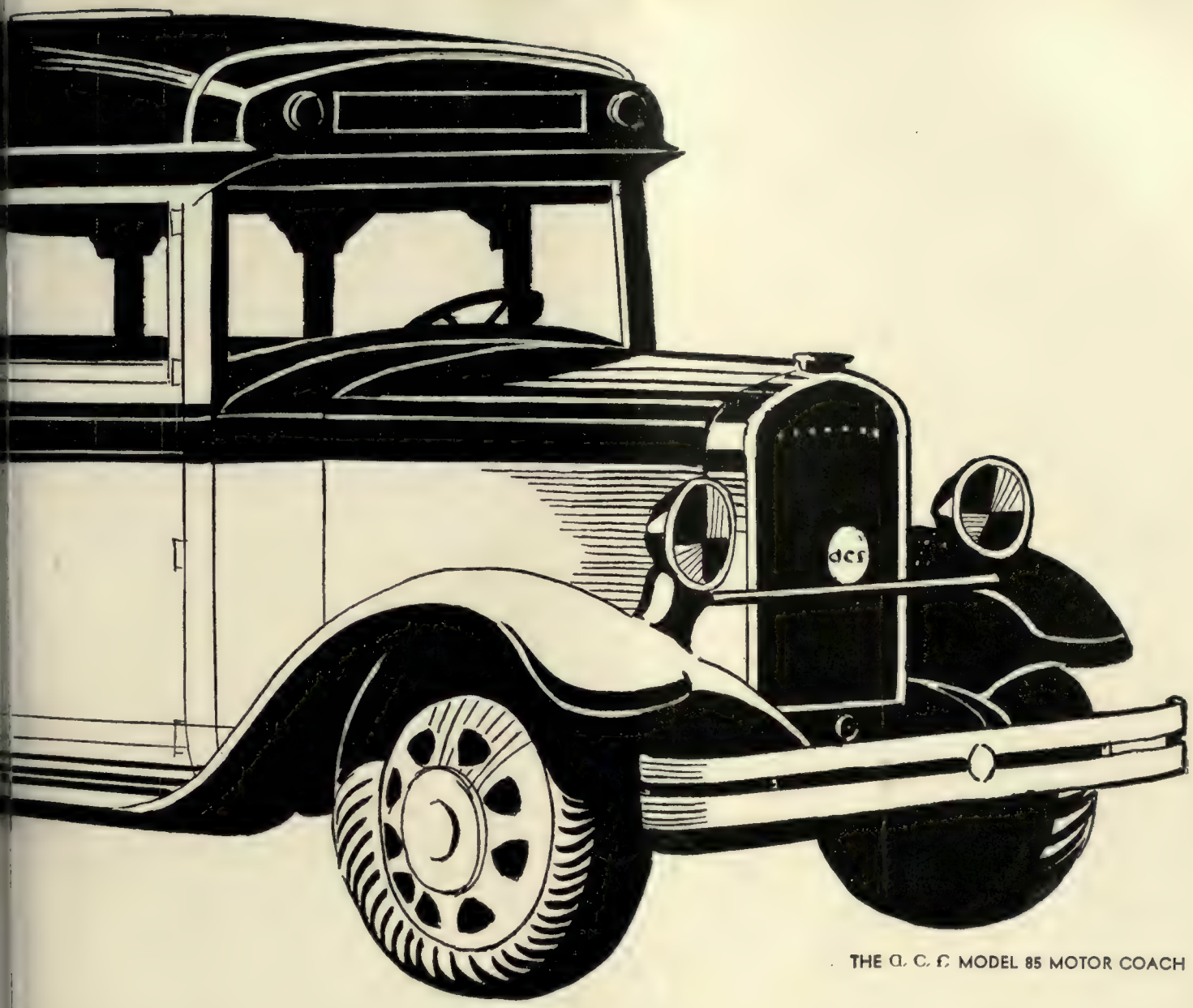


Take a look at the record that a c f buses have run up in Yosemite Park!

Mr. Edwin T. Huffman, manager of the Yosemite Transportation System, writes that two of the a c f buses in his company's service have given 150,000 miles service each without overhauling. More than this, he says that now, after their first overhauling, they seem as good as they ever were, both in appearance and the service they give.

The run of the Yosemite Transportation System through the mountainous Yosemite region covers roads that give a bus a good beating if it isn't built for them. It takes real stuff in a bus to stand up under the continual grind.

But that's the way a c f builds every bus for you. All a c f buses are built out of the finest materials we can lay our hands on . . . but there is a lot more than that to say for them. They are built by men who know buses . . .



THE A. C. F. MODEL 85 MOTOR COACH

who know the things you absolutely must have in a bus to meet your operating requirements. As a result, A. C. F. buses are built both for you and your patrons. They are built to answer the problems of your business . . . to give you dependable steady service, low running cost, long life, and absolute safety to your riders. They are built to give your riders the things that they demand from you . . . speed, comfort and luxury.

There's a business combination that simply can't be licked!

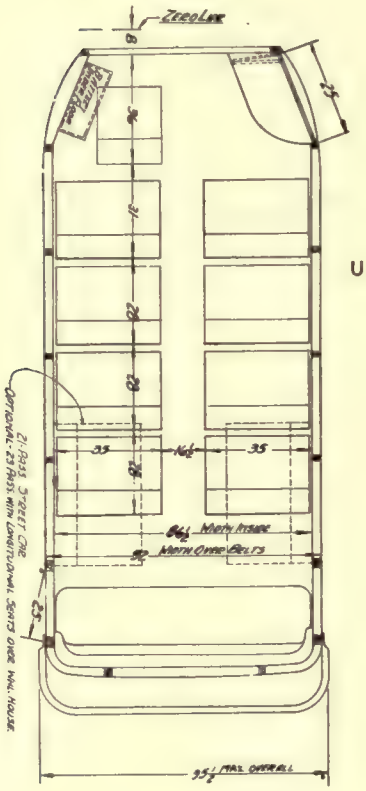
Here is a single example for you . . . the new Model 85 small capacity coach—a real bus, without a single adapted unit in the whole job brought over from truck or passenger car practice.

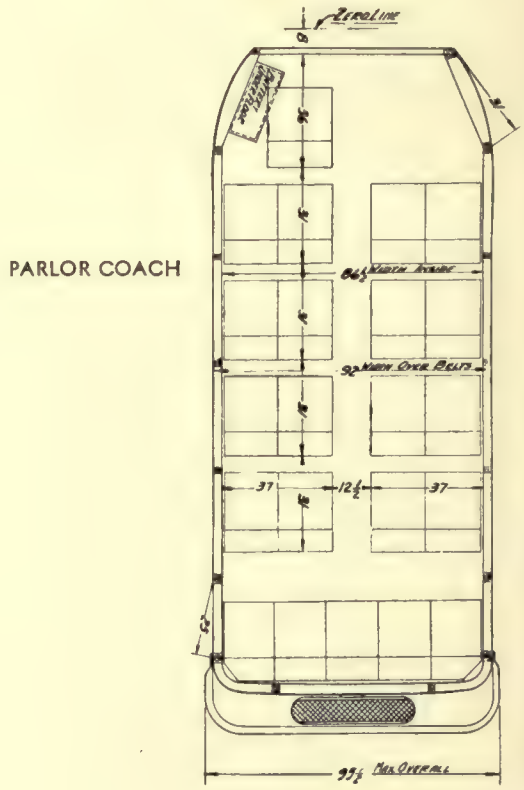
Every unit of the Model 85 coach is designed expressly for bus service. It has a smooth, powerful bus engine that will give you a high gear acceleration, from 10 to 25 miles per hour in only 15 seconds, which means high torque at low engine speeds, with power for acceleration right where you want it! The clutch . . . the transmission and drive line . . . the brakes . . . the

heater, which complies with all state requirements . . . every one has been designed expressly for bus service. And every part and every unit has been designed and built so that it is oversize and stronger than it needs to be for the work it is called upon to do.

You can have Model 85 in either of two body types: a 21 passenger parlor coach, with plenty of seat room and comfort for 21 full grown people, or a 21 or 23 passenger street car.

We will gladly send you more complete details on this model. Won't you write for them today?





AMERICAN CAR AND FOUNDRY MOTORS COMPANY

30 CHURCH STREET — NEW YORK CITY

a. C. f.

Fluted Steel Poles Point the Way to Economy

SINCE the first installation of heavy duty Union Metal Poles, utilities have been quick to realize the economies which this type of equipment affords. Here are some of the reasons why Union Metal Poles will save money for you when used for almost any type of overhead service.

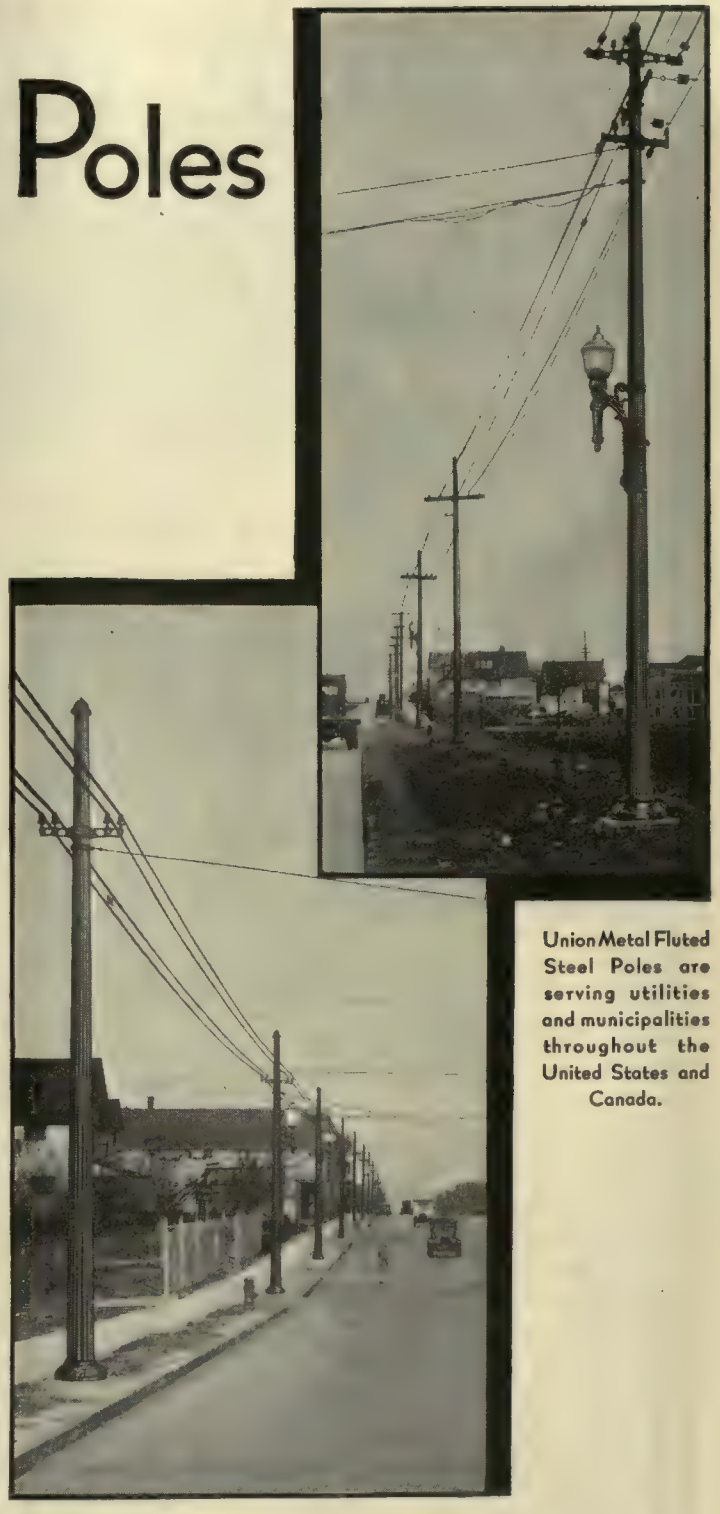
Long life. The pressed steel construction of Union Metal Poles assures much longer life than that of ordinary poles.

Fewer poles are required. Their strength permits heavy loading and the carrying of many different types of services.

Their ornamental appearance is such that property owners make no objections when the poles are installed on residential streets.

Replacements or repairs are economical and speedy.

Union Metal construction insures you of 100% salvage of the poles in case of removal. These are all money saving factors. If you would like to know the complete Union Metal Story, write one of the offices listed below.



Union Metal Fluted Steel Poles are serving utilities and municipalities throughout the United States and Canada.

THE UNION METAL MANUFACTURING CO.
GENERAL OFFICES AND FACTORY: CANTON, OHIO
SALES OFFICES: New York, Chicago, Philadelphia, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

DISTRIBUTORS
Graybar Electric Company, Inc. General Electric Supply Corp.
Offices in all principal cities

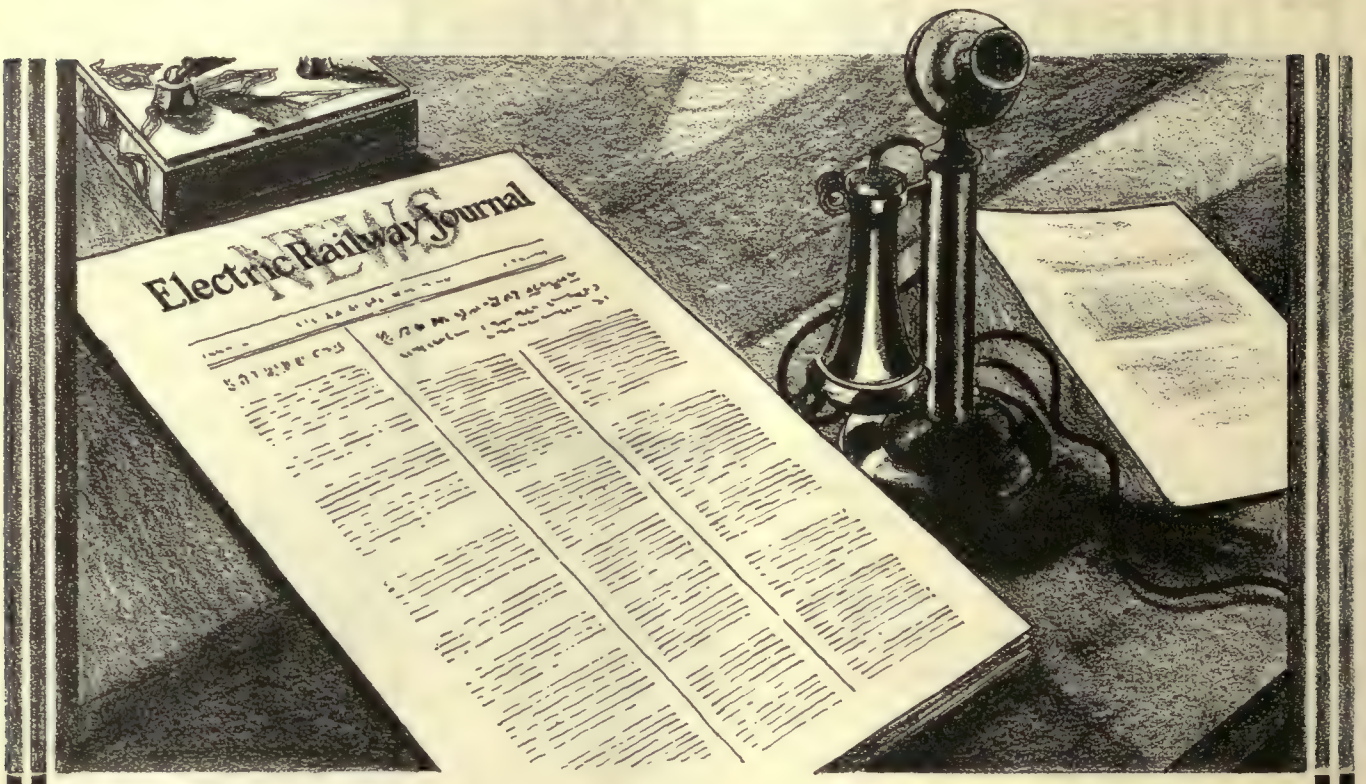
Distributed by GraybaR

UNION METAL

MERCHANDISE DISTRIBUTOR

DISTRIBUTION AND TRANSMISSION POLES

Are you receiving *The Electric Railway Journal* NEWS?



—the Newspaper of the Electric Railway Field

When *Electric Railway Journal* was changed from a weekly to a monthly magazine, electric railway men everywhere asked us to continue to supply the current news of the field.

For that reason, a supplementary service was started, known as the *Electric Railway Journal* NEWS. It appears as a separate newspaper on thirty-nine Saturdays during the year. On the other thirteen Saturdays, the magazine itself appears with current news.

The *Electric Railway Journal* NEWS keeps its readers posted on court decisions . . recent bus developments . . current legislation enacted concerning electric railways . . changes in fare rates . . news of purchasing activities . . financial and corporate notes . . editorial interpretation of vital news . . personal items on men in the field. This newspaper constitutes the most complete guide to new developments in the field.

Subscription price is low—only $2 for the complete year's service of thirty-nine issues. Foreign rate, $4 annually. Sold in combination with the monthly edition of *Electric Railway Journal* for $5 a year, domestic rate. Send no money now—simply fill in and mail the coupon today!

ELECTRIC RAILWAY JOURNAL
10th Ave. at 36th St., New York

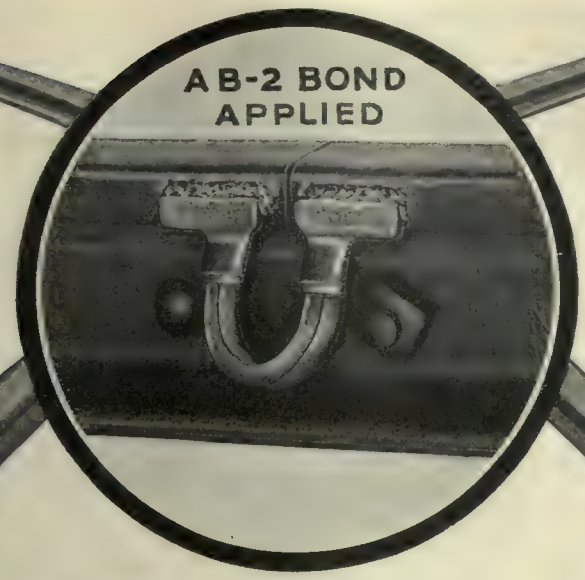
Enter my subscription to *Electric Railway Journal* NEWS. Bill me for $2.

Name

Address

City State

Company



Bond Performance

One of the advantages of buying American Steel and Wire Company Rail Bonds is the assurance you will have of dependable performance. The reason is materials, design, and construction. Our experience has been of the kind that is worth money to you in Bond performance.

The AB-2 Bond is easily and quickly applied with a steel electrode. The open shape of this Bond terminal is especially desirable since the arc can be directed freely at the junction of the terminal and the rail.

Would you be interested in inspecting a sample?

AMERICAN STEEL & WIRE COMPANY

208 S. La Salle Street, Chicago 30 Church Street, New York
And All Principal Cities

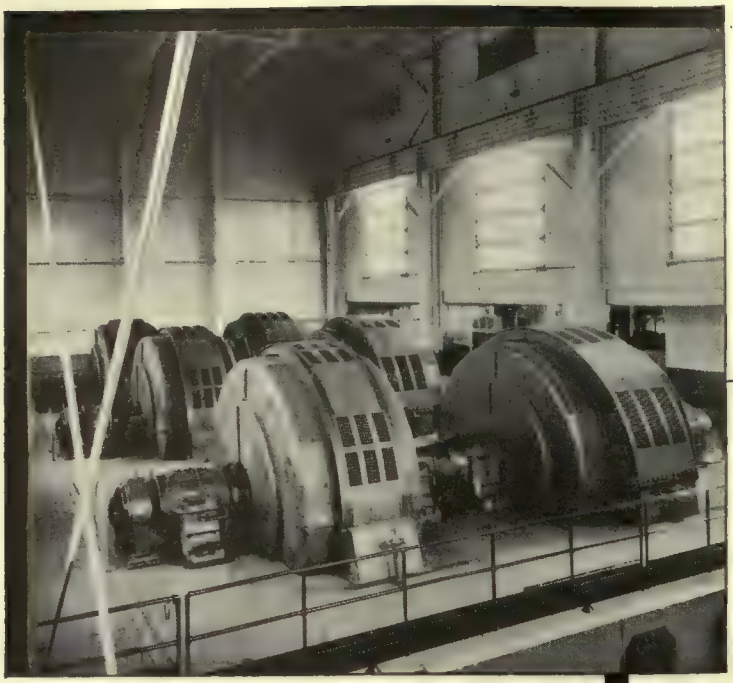
SUBSIDIARY OF
UNITED STATES STEEL CORPORATION

Quality Products *Dependable Service*

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

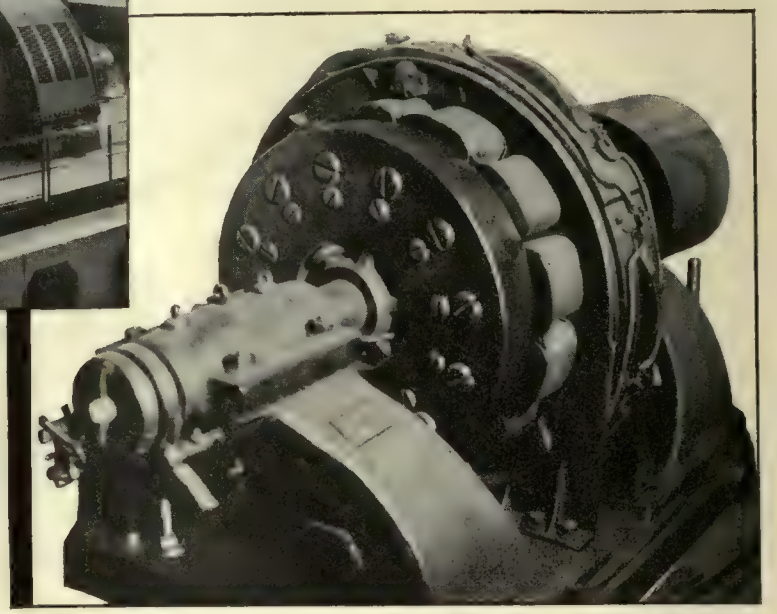
American Bridge Company	Carnegie Steel Company	Illinois Steel Company	The Lorain Steel Company
American Sheet and Tin Plate Company	Cyclone Fence Company	Minnesota Steel Company	Tennessee Coal, Iron & R. R. Company
American Steel and Wire Company	Federal Shipbuilding and Dry Dock Company	National Tube Company	Universal Portland Cement Company

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City



Above: *Three* 15,000 *KW. Frequency-Converter Sets in a modern substation*

. . . the whirl of progress



At right: *Pfannkuche Alternator*

■

"OBSOLETE!" says the engineer who glances at the old-time Pfannkuche Alternator shown above. Obsolete, maybe, but nevertheless a monument to the early days of electric power that mark the beginning of a new civilization.

When this old A. C. Generator was new, National Carbon Company, Inc., already was a vital factor in the development of electrical equipment. Its efforts in consistently improving the quality of carbon brushes made possible persistent headway in motor designs.

The Pfannkuche Alternator was belt-driven and the frequency very inaccurate. But it served its purpose. With the increasing use of electrical power came the standardization of frequency and the development of large central power stations. Then super-power systems came into being. These required, at times, the bringing together of 25 and 60 cycle systems. The link between them is today's frequency-converter. Three frequency-converter sets are shown as they appear in a modern substation.

The coming years will see increased progress. And as greater turbines whirl in response to increasing demand, National Pyramid Brushes will continue to play the important part they have played up to now.

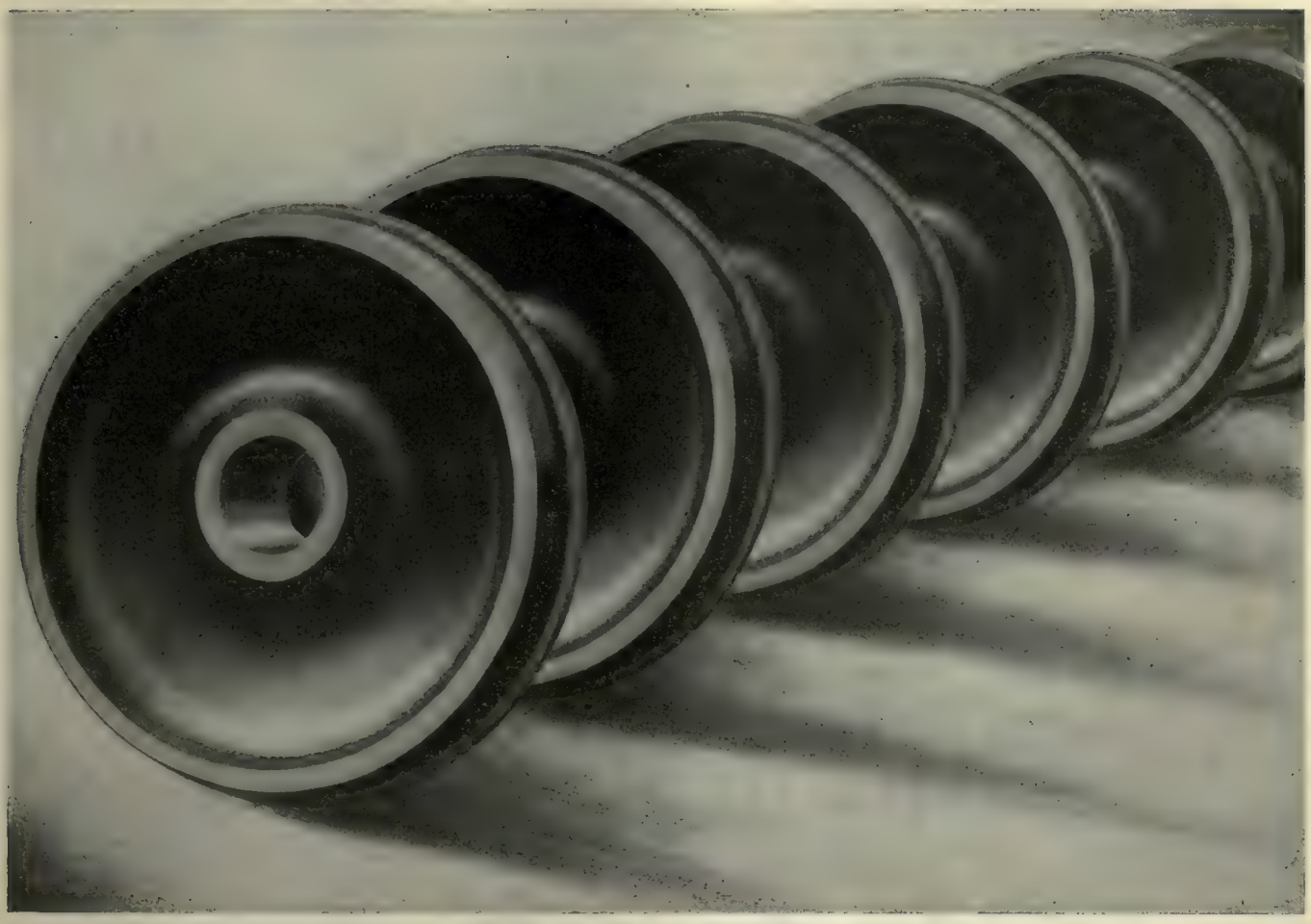
NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division — SILVER STRAND CABLE TRADE MARK REGISTERED — Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco



Safety...above all

Electric railway executives are realizing the many advantages of the Bethlehem Wrought Steel Wheel . . . its adaptability to today's severe traffic conditions . . . its ability to eliminate costly delays, due to slid-flats, shelled treads and broken flanges . . . the many thousands of miles of trouble-free service that it gives . . . and, above all, its safety!

The Bethlehem Wrought Steel Wheel has the strength, endurance and wear-resistance to stand up and deliver exceptional mileage under these severe traffic conditions. Five distinct forging and rolling operations are required to make a Bethlehem Wheel. The forging gives the metal toughness, and density; the rolling establishes a uniform grain structure throughout the wheel, virtually eliminating crystallization and reducing to a minimum the possibility of breakage.

In addition Bethlehem Wrought Steel Wheels have a liberal margin of safety. No wheels made by ordinary methods approach the high standard set by this type of wheel. That is why so many electric railways are turning to Bethlehem Wrought Steel Wheels. Your inquiry will receive prompt attention. Write today.

BETHLEHEM STEEL COMPANY

General Offices: **Bethlehem, Pa.**

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City.

FORGED AXLES: **Extreme care is exercised in the manufacture of Bethlehem Axles. Special heat treatment gives them ductility and a high elastic limit. And they give excellent service under severe torsional stresses.**

BETHLEHEM
Wrought Steel Wheels



"Our 26 Coaches *will exceed* a Million Miles in 1930 *on* Goodrich *exclusively*"

MR. F. M. TEMPLE, Assistant Manager of the Interurban Transit Lines, Incorporated, (operating the "Short Way" Lines) and well known in Bus circles, makes the following comments regarding Goodrich Tires:

"Our twenty-six coaches which operate out of Toledo are equipped 100% with Goodrich Tires.

"During the year of 1929 our fleet covered in excess of 1,000,000 miles and we expect to exceed 1,200,000 miles in 1930 for our entire operation.

"We are pleased to state that during the last four years in which we have used Goodrich Tires exclusively, we have had every reason to be satisfied not only with the tires, but with the fine spirit of service and coöperation rendered by your local Branch and the factory."

The B. F. Goodrich Rubber Co., Est. 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ontario.

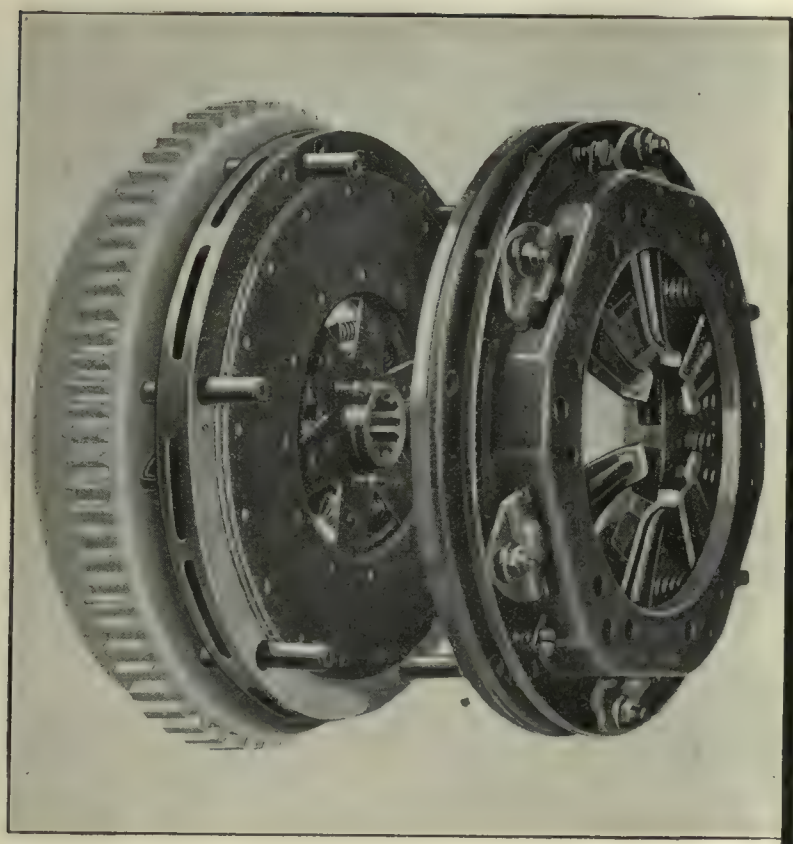
7 *SUPERIOR SPECIFICATIONS*

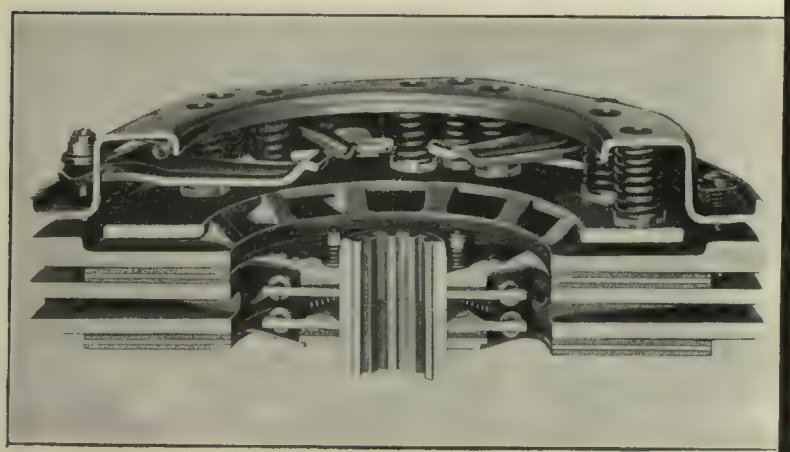
BUILT INTO EVERY HEAVY DUTY SILVERTOWN

1. Heavily insulated stretch-matched cords.
2. Additional adhesion — from greater insulation between outside plies.
3. Heavy twin beads for better rim seating.
4. Extra gum fillers between plies for longer tire life.
5. Heat-resisting, interlocking cord breakers.
6. Tread designed correctly for heavy duty service.
7. The whole tire toughened by the famous Goodrich "water cure."

Goodrich HEAVY DUTY Silvertowns

• SPECIFY GOODRICH ON YOUR NEW BUSES •





A NEW HEAVY DUTY DESIGN

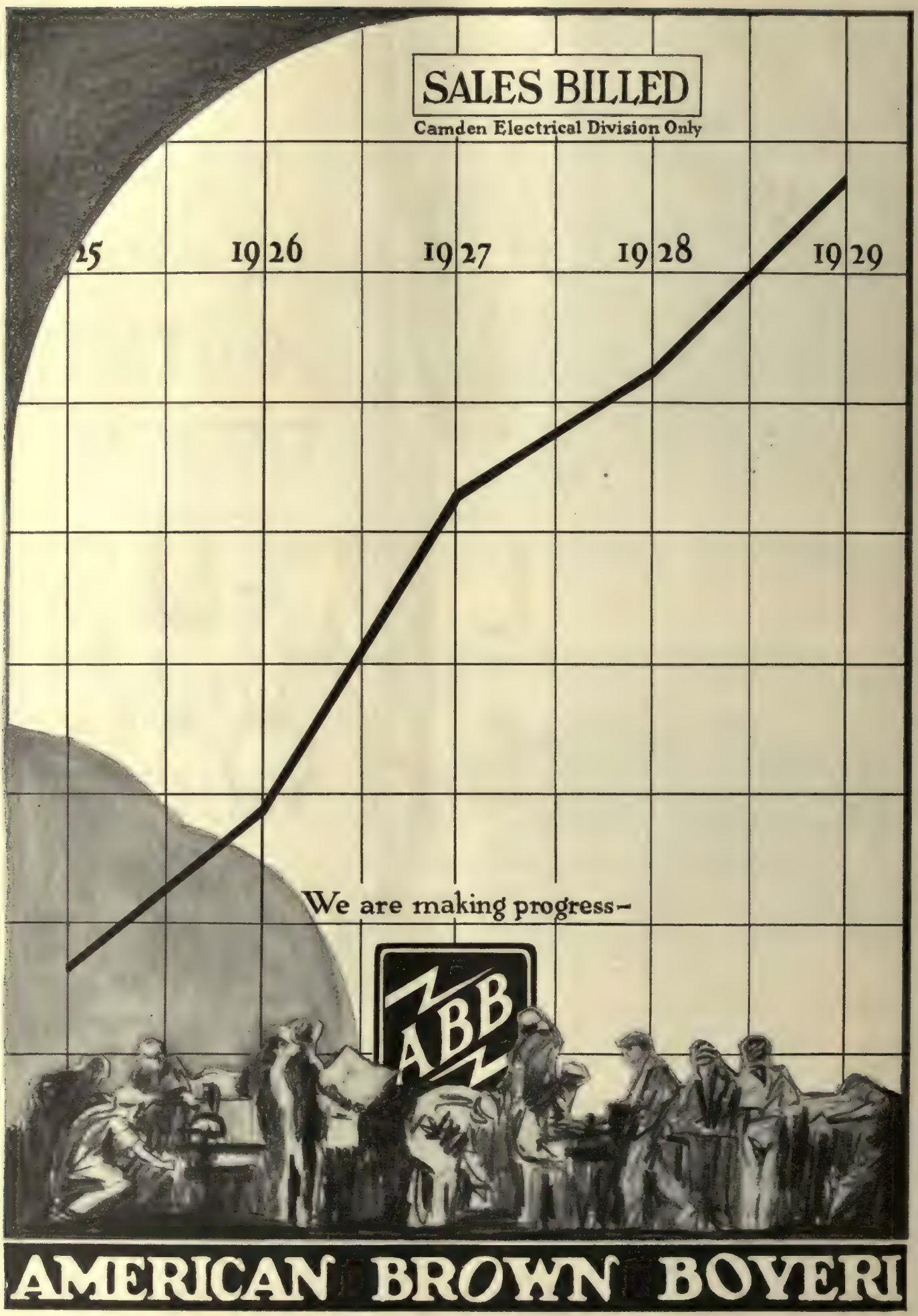
FOR BUSES TRUCKS AND TRACTORS

LONG

AUTOMOTIVE CLUTCHES

AUTOMOTIVE RADIATORS

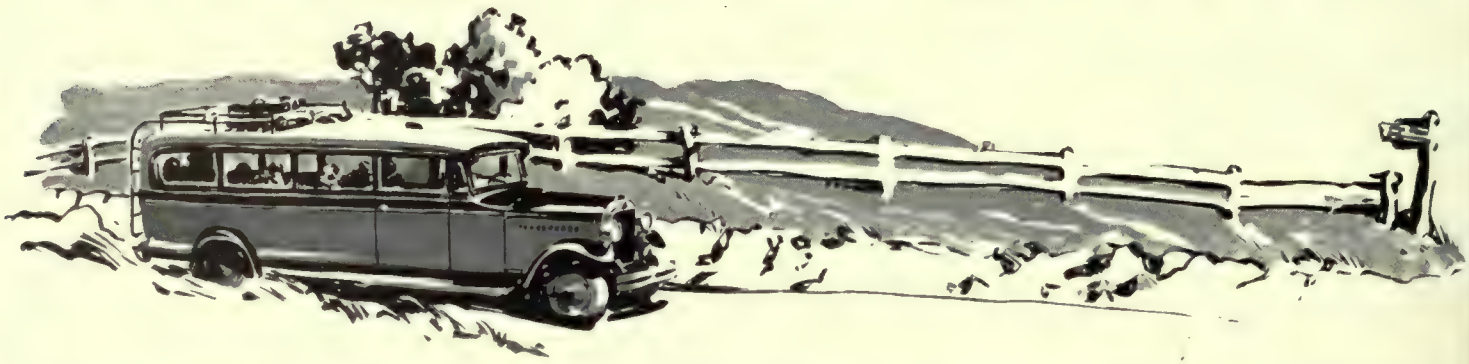
LONG MANUFACTURING COMPANY
DETROIT, MICHIGAN


SALES BILLED
Camden Electrical Division Only
25
1926
1927
1928
1929
We are making progress–
ABB
AMERICAN BROWN BOVERI



LET US SHOW YOU

. . . how costs modernizing with





DODGE BROTHERS

are lowered by Dodge Coaches

High costs give way to lower costs when old equipment is replaced with modern Dodge Coaches

Operators, large and small, are fast coming to the sound realization that many a motor coach is too old to run economically. High operating cost, high maintenance cost and the discouraging of patronage with obsolete equipment — all are making stealthy inroads on investment returns.

Operators, large and small, are likewise finding in modern Dodge Brothers Motor Coaches the very qualities they need. These attractive coaches enable them to provide safe, comfortable, dependable service at a lower cost of operation and maintenance.



MOTOR COACHES

Low maintenance costs assured

CHASSIS: clean, sturdy and simple in design—easily accessible. Note absence of complicated brake linkages, rods and cables.

RADIATOR: honeycomb type; shutter controlled from driver's seat. Water-temperature indicator on instrument board and thermostat in engine provide additional temperature control for economical operation.

TRANSMISSION: heavy-duty type with four speeds forward. Built to withstand the constant gruelling service demanded by bus operators today.

STEERING: easy, quick and certain, is insured by the sturdy nut and lever steering gear. Simplicity and rugged design make maintenance negligible.

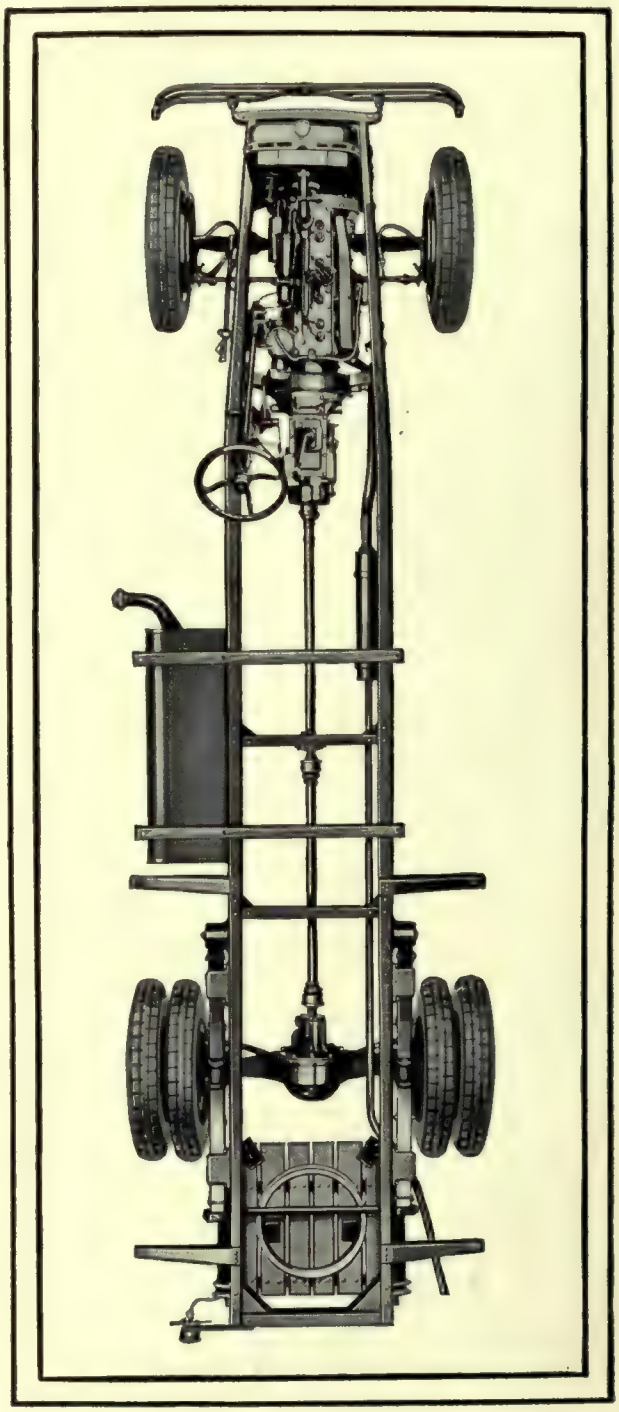
REAR SPRINGS: 3-stage, progressive type, provide surpassing riding comfort. Flexibility, without sacrifice of strength, is assured with varying loads by the progressive action of each of the three spring sections.

BRAKES: safe, 4-wheel hydraulic with American Brakeblok linings and gun iron drums. Large, certain-in-action, long-wearing, require but the minimum of periodic attention.

ENGINE: Dodge Brothers 6-cylinder, furnishes a smooth flow of power. Designed and built with special thought to the needs of users who seek simplicity, economy and long life.

CRANKSHAFT: of the 7-bearing type weighs 69 pounds; total projected bearing area 28.36 sq. in.

Weigh well the importance of these and other chassis refinements such as oil filter, air cleaner, gas filter and crankcase ventilator. They help to lower maintenance costs.



DODGE BROTHERS
MOTOR COACHES



GOOD WILL IS IMPORTANT— DON'T RUIN IT WITH FUMES



Good will is important to any business . . . it is a priceless asset to the transportation company. If your motor coaches are releasing objectionable fumes . . . if they are gassing pedestrians and potential patrons . . . they are seriously endangering good will and your business.

The sulphur and impurities that are present in many fuels and lubricants, are a major cause of obnoxious combustion odors. Red Crown Gasoline and Polarine Motor Oil, highly refined, pure and practically free from sulphur, do not produce these stifling combustion odors.

As a motor fuel Red Crown ranks at the top, giving power, mileage, economy. Polarine is pure and rich, supplying thorough, efficient lubrication to the motor. Working together they give that perfectly balanced performance which insures dependable service and low cost operation.

A test will convince you that Red Crown and Polarine form an ideal combination for your motor coaches.

STANDARD OIL COMPANY
(INDIANA)

910 S. MICHIGAN AVE. CHICAGO, ILL.

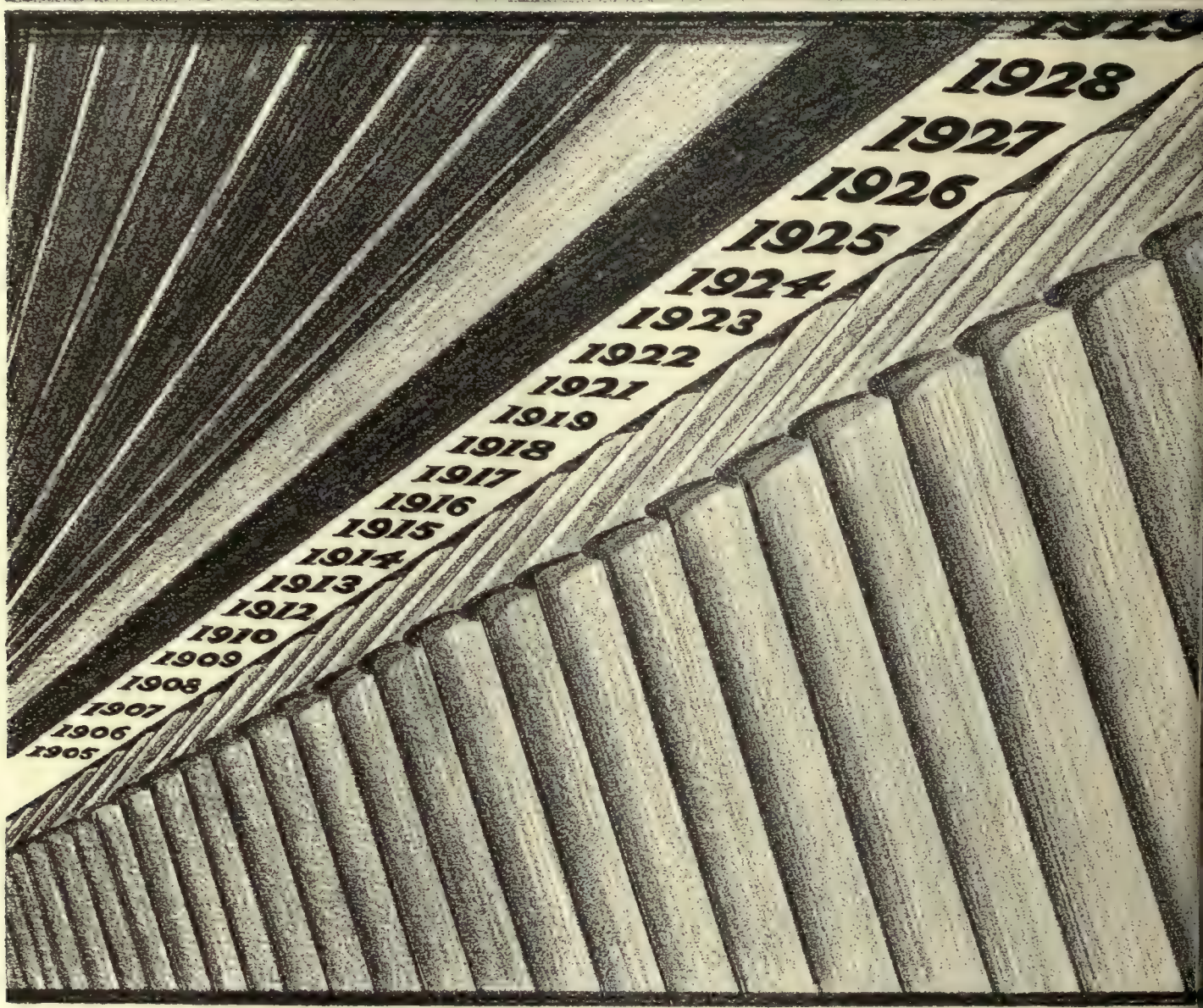
1327

Chicago, Davenport, Decatur, Des Moines, Detroit, Duluth, Evansville, Fargo, Grand Rapids, Green Bay, Huron, Indianapolis, Joliet, Kansas City, La Crosse, Mankato, Mason City, Milwaukee, Minneapolis, Minot, Saginaw, Sioux City, Peoria, Quincy, South Bend, St. Louis, St. Joseph, Wichita

RED CROWN GASOLINE

POLARINE MOTOR OIL

Through the years,



METAL & THERMIT

PITTSBURGH CHICAGO BOSTON 120 BROADWAY

1930

"THERMIT"

Back in 1905 this Company was formed to produce and sell Thermit in the United States. And because this process of welding was sound, and because its product has always been good, this Company has grown and prospered. Long time service is the real test of any product or process. Thermit Welds are permanent. They last as long as the rail itself. Cars are still operating over Thermit Welds which we made eighteen years ago. It was called "Thermit" then and it bears the same honorable name today. Although basically the same material, Thermit has been greatly improved by better control of the raw ingredients and the processes of manufacture, thus insuring the best possible product with absolute uniformity. Furthermore the methods of Thermit welding have been perfected and simplified. The Metal & Thermit Corporation has achieved its present size and prestige only by a continuous policy of research, study and improvement in its welding method. When you buy from the Metal & Thermit Corporation you are buying more than merely bags of material. You are buying engineering service. You secure the benefit of experience gained on many other properties. You have a guarantee of a satisfactorily completed job. We are not satisfied until you are.



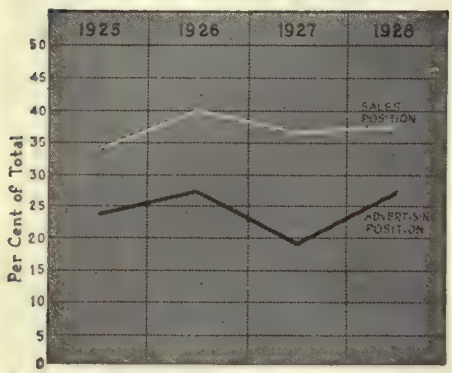
CORPORATION

EW YORK, N.Y. SOUTH SAN FRANCISCO TORONTO

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

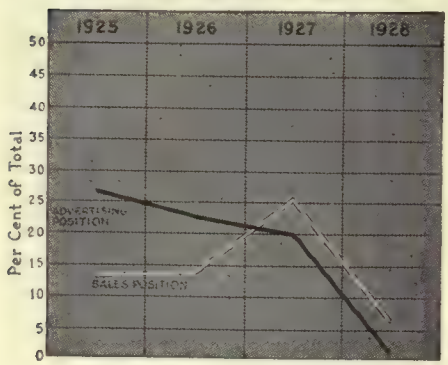
Does advertising schedule have anything to do with sales?

MANUFACTURER SMITH



These charts, compiled by McGraw-Hill, present the sales and advertising history of two competitors making the same kind of product and selling it to the same market through the same two publications.

MANUFACTURER BROWN



The white curve shows each manufacturer's share of total sales in the particular industry. The black curve shows how much of the total competitive advertising (on a page basis) each manufacturer used in this market.

Yes, according to the experience of Manufacturer Smith whose sales staff from top to bottom is advertising minded. Smith's schedule has been consistently maintained over a period of years in every issue of two McGraw-Hill publications.

* * * *

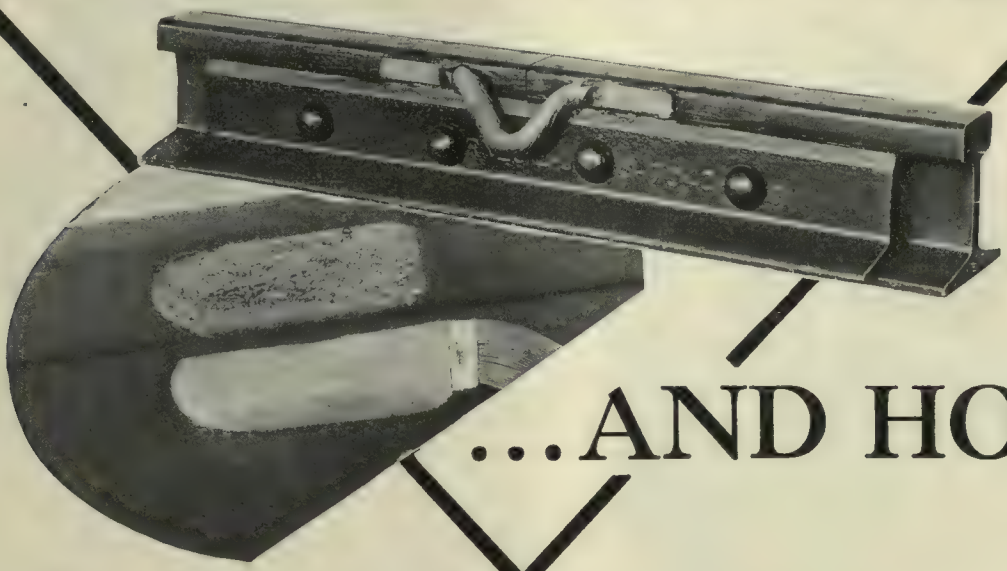
Yes, according to the experience of manufacturer Brown whose sales executives are not so advertising minded. Brown's schedule in the same publications was consistent up to a certain point and then sharply curtailed. He believed that product quality would take care of most of his future sales.

Printers' Ink says succinctly: "The way to make money by using advertising is to use it — not to fiddle with it." Do not these two experiences from the industrial field endorse this as something stronger than theory?

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit St. Louis
Philadelphia Greenville San Francisco
Boston London

STAY ON THE JOB?



...AND HOW!

LOOK at the terminal on the Type E A S Erico Brazed Bond! It took 30,000 pounds to shear it from the rail—and observe the area of copper left on the rail. Ask yourself if even the most severe service is apt to knock an Erico Bond loose.

Erico Bonds stay on the job, provide lasting, low resistance bonding. They can be applied in 60 seconds per terminal, with results shown in the unretouched photo above. Application is practically automatic. A few simple rules in operating the welding furnace and the bonder will secure uniformly good results.

The heat of application is *not injurious to the rail structure* and is so low that the entire process of application may be watched by the bonder with the naked eye.

E A S Brazed Bonds can be applied to standard or heavy beaded splice bars. Let us aid you in selecting the bond to fit your rail joint. Address

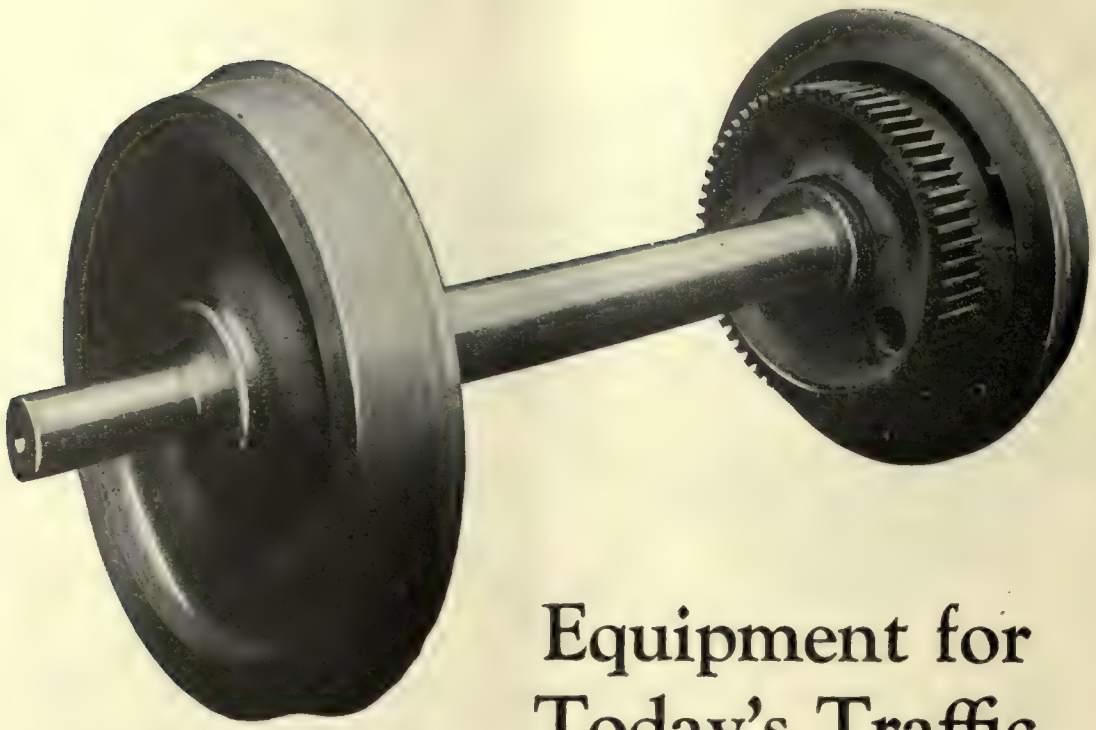
The

Electric Railway Improvement Co.

2070 E. 61st Place Cleveland, Ohio

ERICO

RAIL BONDS AND BONDING OUTFITS



Equipment for Today's Traffic

In today's heavy traffic—increased wheel mileage with lower maintenance cost, can be obtained in "Standard" Wheels.

Durability, increased wearing qualities and safety are forged and rolled into "Standard" Wrought Steel Wheels.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA. **WORKS: BURNHAM, PA.**

Products

Steel Axles
Steel Springs
Armature Shafts
Rolled Steel
Wheels

SALES OFFICES:

New York Chicago St. Louis
Richmond Portland
San Francisco

4 years of Satisfaction + Economy with Socony Regular Gasoline



Part of the fleet of buses operated by the Interstate Street Railway Company on Socony Gasoline.

THE fourteen buses of the Interstate Street Railway Company run between Attleboro, Mass., and Providence, R. I., and are also chartered for special jobs. They have been fueled exclusively with Socony Regular Gasoline for four years.

Operation has been so economical and satisfactory that this company has never switched to any other brand of fuel.

Socony products offer the logical solution to all gasoline and motor oil problems. Not only do they increase performance, but also their use lowers operation costs.

Join the ranks of fleet owners who use Socony Gasoline. Once you have tried it, you will find no reason to change.

SOCONY

Gasoline **Special Gasoline** *plus* **Ethyl**

Motor Oil **Aircraft Oil**

STANDARD OIL COMPANY OF NEW YORK



Don't Neglect Your Seats!

If they are right your service and revenues will increase, wrong and the passenger will leave your bus with a feeling of relief. You want satisfied customers not passengers who regret every riding minute.

Don't neglect your seats.

General Leathers for seat coverings can help you make satisfied customers. They are soft and comfortable, clean easily with soap and water, and will not get sticky in any weather. Attractive to the eye, fast in color, its a pleasure to ride on General Leathers.

Hides are furnished in all sizes and colors.

On quantity orders, we cut directly from your patterns to eliminate all waste.

Experience on bus work has proved that General Leathers do a 100% seat covering job.

Our Specialties which we Recommend for this Purpose:

Majestic Full Grain Leathers
20th Century Spanish Leathers
Genleaco Leathers
Salon Hand Buffed Leathers

Write for samples. Specify General Leathers on your next orders for Electric Cars, Buses and Taxi Cabs or when you overhaul your seat coverings.

GENERAL LEATHER COMPANY

Makers of Famous Tried and Proven "00" Leathers

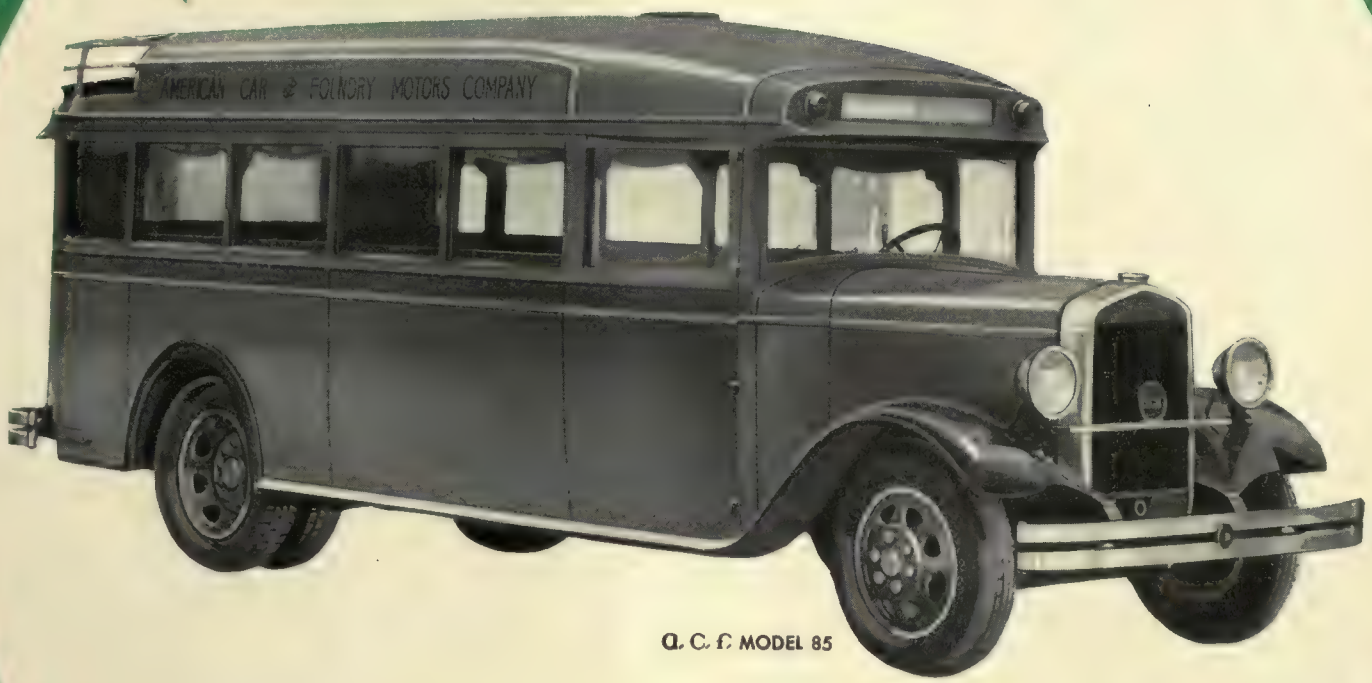
NEWARK, N. J.

Detroit Office
Stoddard Lovely & Co.
10-219 General Motors Bldg.

Canadian Office
Colonial Traders, Inc.
78 Williams St., Chatham, Ont.

London Office
R. & A. Kohnstamm, Ltd.
21 West Smithfield, London, E. C.

West Coast Office
A. J. & J. R. Cook, Inc.
237 Eighth St., San Francisco



A. C. F. MODEL 85

Here is an unusual "small capacity" coach—

Every single part and unit has been designed

expressly <u>for bus service!</u> A TRUE BUS!

a. C. f.



a.c.f. MODEL 85

a.c.f.

This new model 85 passenger coach is not a rebuilt passenger car nor a rebuilt truck! There is not a single unit in the whole job that has been brought over from passenger car or truck building practice.

a.c.f. has spent years in the study of the problems of coach transportation, and realizes very thoroughly that a bus must be designed . . . every part of it . . . FOR BUS SERVICE!

Model 85 is a bus in every sense.

It has a BUS engine — a flexible, dependable, economically operated 6-cylinder power plant designed especially to meet the requirements of motor coach transportation. It is an engine that will give you a high gear acceleration from 10 to 25 miles per hour in only 15 seconds. This means high torque at low engine speeds—power for acceleration right where you want it!

Every other part follows this right out . . . there's a BUS clutch, a BUS transmission and drive line, BUS brakes, and an efficient heater complying with all state requirements, as standard equipment.



a. c. f. MODEL 85

a.c.f.

Every part has been designed so that it is oversize, and stronger than it needs to be for the work it has to do. You can check every one of them, and you'll find that in every case, the parts of this Model 85 bus are heavier, larger and stronger than standard practice for a bus of this capacity and weight. Model 85 is built for steady, hard service and with ordinary regular maintenance there is not the slightest possibility of failure of any of its units because of too-small or too-weak parts!

You can choose either of two types, depending upon your requirements in the service you are offering:

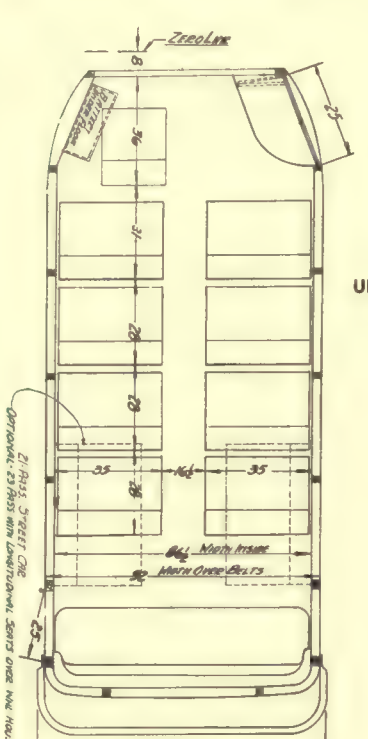
A 21 passenger parlor coach, with plenty of seat room and comfort for 21 fullgrown people.

A 21 or 23 passenger street car.

You can count upon maximum value from this new a. c. f. model, for a. c. f.

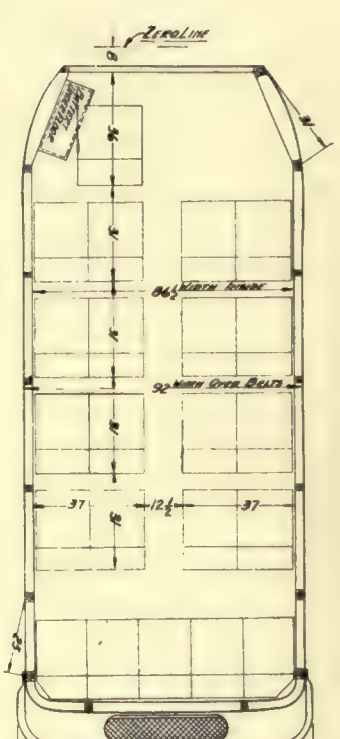
has taken care in every step of its designing and building to be sure that you get it!

We will be glad indeed to send you more complete specifications and details of this model. Why don't you write today?



URBAN COACH

PARLOR COACH



a. c. f.

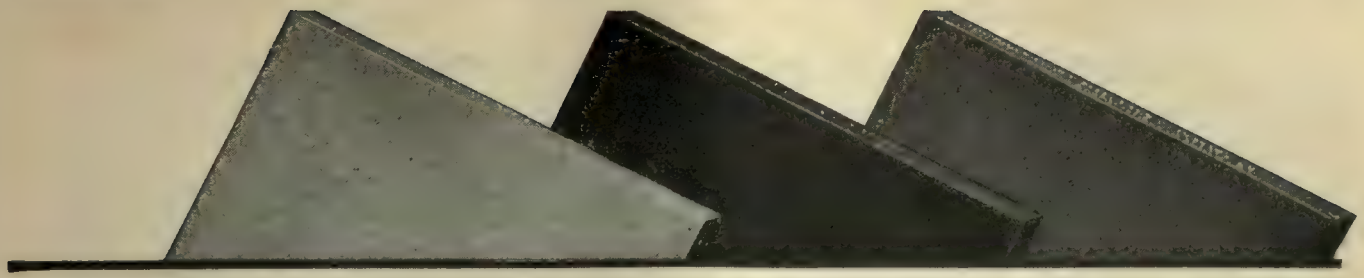
AMERICAN CAR AND FOUNDRY MOTORS COMPANY

30 CHURCH STREET — NEW YORK CITY

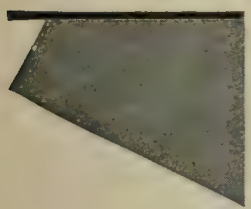


a. c. f. MODEL
INTERIOR

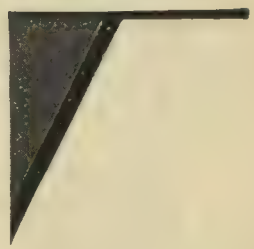
a.c.f.



Three long established electrical materials every railway can use to advantage



TRANSITE . . . ASBESTOS EBONY . . . ELECTROBESTOS



THESE three Johns-Manville products are all proving their greater efficiency and added economy in an increasing number of applications on the electric railway car. For many years these durable materials, formed in combination with asbestos, have met the needs of the Electrical Industry for insulating panels and parts, for arc barriers or wherever high dielectric strength and fireproofness are required.

J-M Asbestos Ebony is particularly well suited for electric insulating boards, spacer bars, panel boards and in many other instances where there is need for a board form of dielectric insulation. This rugged material, supplied in sheets or in moulded forms, is moisture-proof and will not warp or crack.

Wherever there is need for a highly efficient fireproof board, Electrobestos and Transite offer ideal materials for insert pieces on arc chute boxes, finger flash shields, circuit breaker boxes or any place where there is an exposed arc to capture. They are light in weight and easily handled and can be cut almost as readily as wood to fit any desired shape. Electrobestos is usually supplied in moulded form for convenience.

J-M Engineers will be glad to suggest the use of these low cost materials where they can do a job competent to meet the requirements of higher voltages and the demands for quicker service. Fill out the coupon for further information.

J-M Friction Tape

. . . another J-M Product

J-M Friction Tape has a reputation earned by giving years of satisfactory service. Woven from selected sheetings, impregnated with an insulating compound and coated with a high grade adhesive rubber composition, it provides a safe covering for exposed wires.



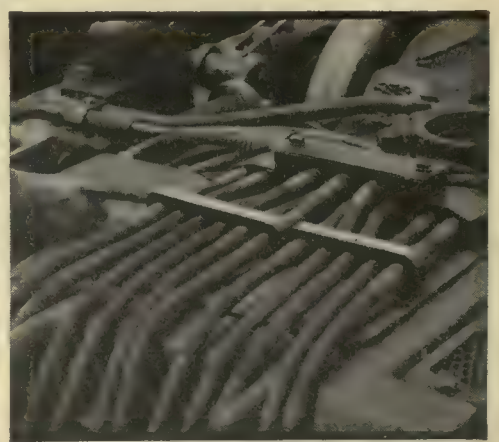
A typical J-M Arc Chute Box of Asbestos Ebony and Electrobestos

Bus & Car Insulation — Refractory & Insulating Cements
Fibre Conduit — Asbestos Exhaust Pipe Covering — Transite
Power Plant Insulations — Masticoke & Truss Plate Flooring



J-M Electrobestos Finger Flash Shields





Johns-Manville Asbestos Ebony Motor Lead Spacer Bars

Asbestos Shingles — Brake Blocks & Linings — Built-up & Ready-to-lay Roofing — Asphalt Plank — Tile Flooring
Packings — Electrical Insulating Materials — Friction Tape

Johns-Manville

SERVICE TO TRANSPORTATION

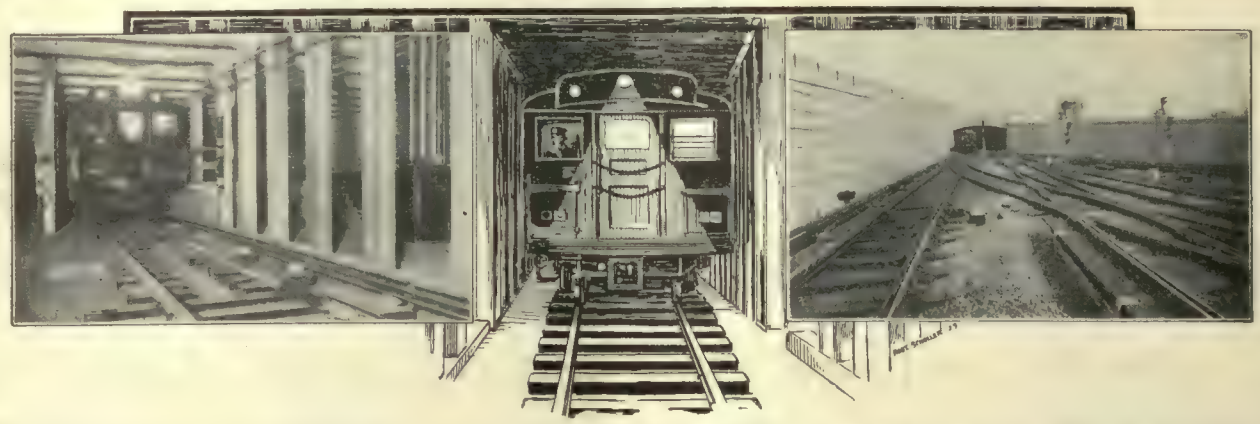
Address JOHNS-MANVILLE
At nearest office listed below
New York Chicago Cleveland San Francisco Montreal
(*Offices in all large cities*)

Please send me particulars on J-M Asbestos Ebony, Electrobestos and Transite Electrical Parts.

Name.....

Address.....

TS-11-3



"Union" Signals Speed Traffic on P.R.T.

PHILADELPHIA'S newest high speed transit system, the Broad Street Subway, has been signaled by the Union Switch and Signal Company. This is a four-track structure having six interlockings in its seven-mile length. Trains are operated on close headway at the peak hours.

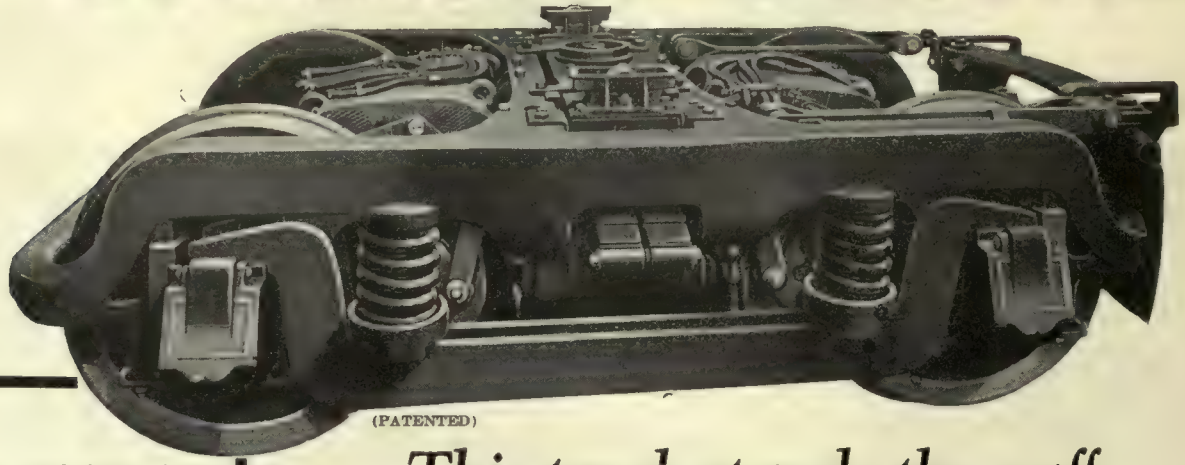
"Union" Subway Type Signals, Model 14 Electro-pneumatic Interlocking Machines, and auxiliary apparatus speed traffic on this system as on the others in Philadelphia. "Union's" half-century of experience in the signaling field enables it to meet your signaling needs and provide added economies.

Our specialists are at your service without obligation.

1881 Union Switch & Signal Co. 1930

SWISSVALE, PA.

COMMONWEALTH



(PATENTED)

Cast steel frame, including cross and end transoms, a single strong unit.

Pedestals cast integral with frame. Removable hardened spring steel liners protect them from wear.

This truck stands the gaff of high-speed interurban service!

It's a Commonwealth Motor Truck. And the long service it gives at remarkably low maintenance has made it standard with many of the most progressive railways.

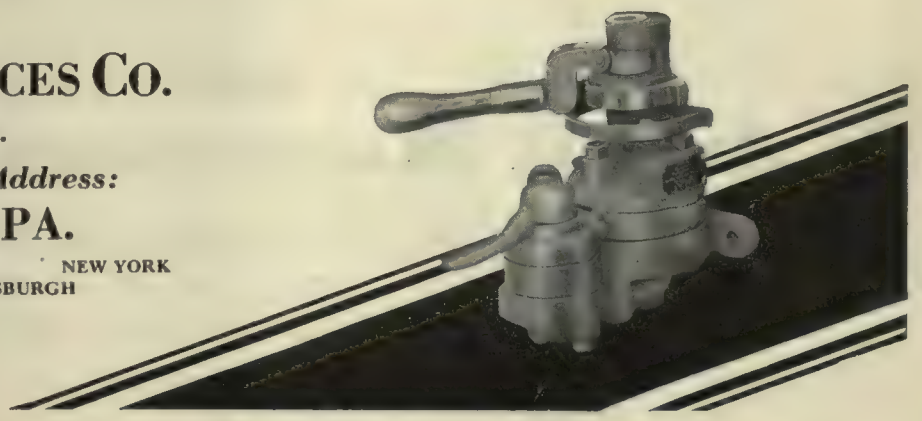
GENERAL STEEL CASTINGS CORPORATION

COMMONWEALTH DIVISION *GRANITE CITY, ILLINOIS*

The SAFETY CAR CONTROL EQUIPMENT

» » » » INCREASES
Safety of Operation

INTERLOCK feature permits centralized operating responsibility . . . prevents opening of doors before car stops, or starting of car before doors close . . . and causes an emergency brake application if controller handle is released due to motorman's negligence or disability while car is in motion.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK
WASHINGTON PITTSBURGH

Electric Railways to Spend 371 Millions This Year

Based on an Investment of More Than 5 Billions . . . a Gross Revenue of Over a Billion . . . and the Highest Net Income They've Ever Made

THE electric railway companies are budgeted to spend $371,220,000 during 1930 . . . more than a million dollars a day.

For new equipment and maintenance alone, they expect to spend $251,530,000, an increase of more than 15 millions over 1929 . . . more than 25 millions over 1928.

It is significant that not only the totals, but the appropriations for each account are increasing. This can only indicate that *the maintenance standards of the railways are being steadily raised.*

Increasing net profits, expanding bus operations, favorable track readjustments, larger purchases of rolling stock . . . all reflect the great improvement in the financial situation. Nearly 1,500 new cars were purchased, and a larger number of old cars scrapped than ever before, in 1929.

Electric Railway Journal's "Maintenance Contest" will be continued in 1930 for the fourth successive year, in cooperation with the American Electric Railway Engineering Association. These contests have aroused widespread interest in maintenance practices. Each year has produced an increasingly large number of competitors, nearly 200 having submitted suggestions for improved maintenance in 1929.

THIS YEAR, THEREFORE, the editorial pages, will have special significance . . . the advertising pages extraordinary value . . . in

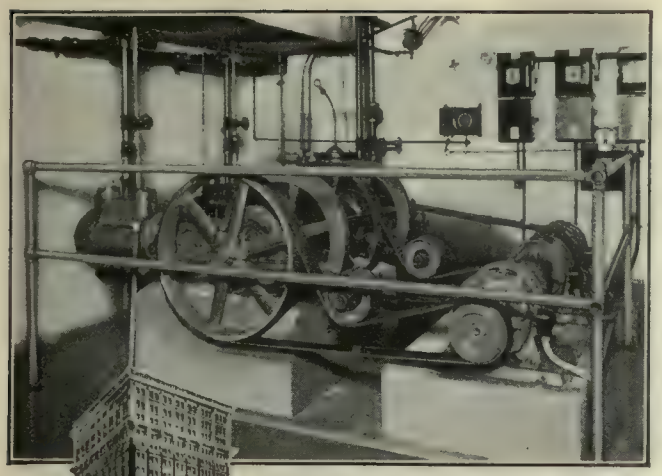
THE

ANNUAL MAINTENANCE NUMBER

of *Electric Railway Journal*

APRIL ISSUE

Advertising Forms Close March 19.



Two Sullivan single stage belted compressors installed in the Farmers Bank Building, Pittsburgh, Pa.



where Air improves service to the customer, in 8 ways

Dependable, economical air power is a vital factor in servicing the customers of a large office building.

Air assures water supply to the topmost stories. It controls furnace dampers, opens and closes elevator doors, operates doctors', dentists', jewelers', and barbers' equipment, ejects sewage. Eight tasks or more, are done by air for many modern office buildings.

For this service, as well as for factory service—trouble-free, automatic operation has made Sullivan single stage belted compressors popular.

Details of the Sullivan "WG-6" Compressor

Short belt drive, automatic control, sweep-control unloading, splash lubrication, Wafer Valves, rugged construction, ample bearing areas, water jacketed cylinders and heads, continuous economical service.

Capacities 68 to 500 cubic feet per minute. Catalog 83-I.

SULLIVAN TRADE MARK

SULLIVAN MACHINERY COMPANY

809 Wrigley Building Chicago, Ill.

Protect it with a Nachod



Nachod Signal on Interurban lines of the Milwaukee Electric Railway and Light Co.

ANY of your highway crossings can be a "dead man's" crossing—but none of them will have that expensive reputation if they're protected with Nachod Highway Crossing Signals.

Durable and dependable, Nachods operate day and night. The powerful warning lights can be seen at a distance—combined with the vibrating bell, they give your crossings the best possible signal protection.

For more than a few properties, this economical highway crossing protection has paid profits. Write for details.

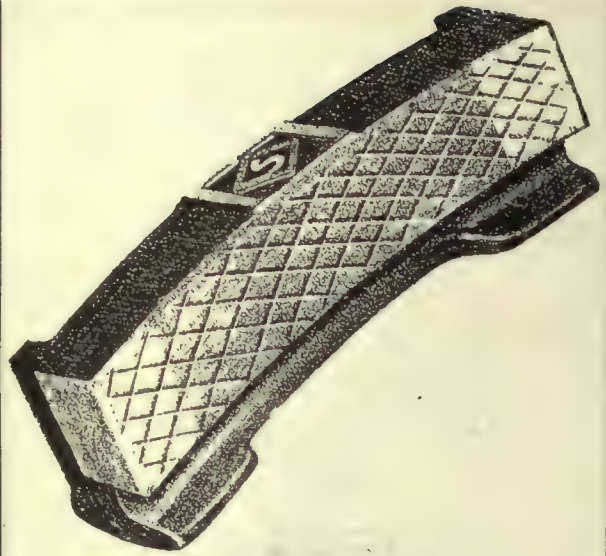
Nachod Spells Safety

Not alone on your crossings but throughout your system NACHOD equipment can spell safety. On those properties where accidents are the lowest you'll find NACHOD protecting life, property and equipment—saving untold dollars—contributing to uninterrupted service.

NACHOD & UNITED STATES SIGNAL CO., Inc.

LOUISVILLE, KY.

WE ALSO MANUFACTURE: *Turn-right Signals, Signals for Single and Double Track, Stub End Signals, Annunciator Signals, Headway Recorders.*



GOOD SHOES are now imperative

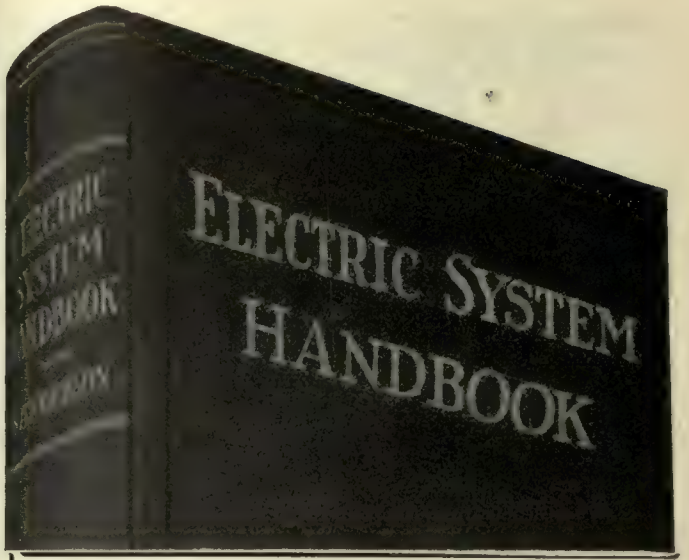
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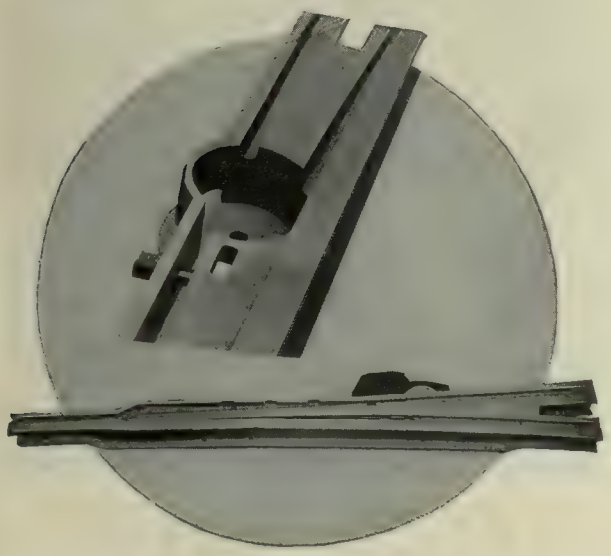
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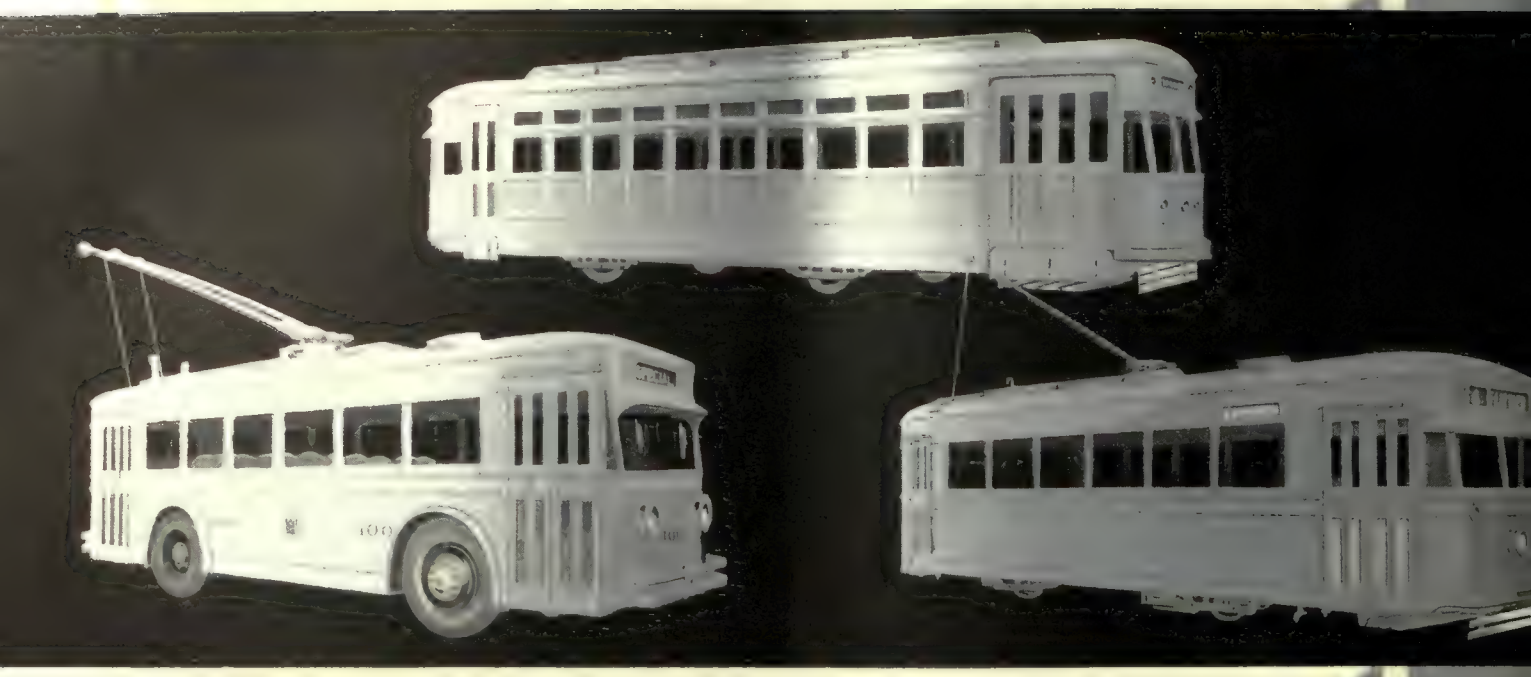
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STRONG TO BEAR BURDENS —LIGHT TO MOVE



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"FAST BECOMING A LOGICAL ECONOMIC FACTOR IN STREET CAR CONSTRUCTION"— SAYS THE J. G. BRILL COMPANY



Profit replaces loss when pay-load replaces dead-load

A 30% reduction in non-pay load has turned losses into profits for street car companies. Such an amazing slash in dead-weight is possible through the use of the light, strong Alloys of Alcoa Aluminum.

In this 2-page advertisement we show 4 actual examples of cars, built by The J. G. Brill Company, employing Alcoa Aluminum:—

On page one we show an example of a production car built on the master-unit principle by The J. G. Brill Company. Cars of this type are operated in Lynchburg, Virginia.

Above (in center) is the Brill 4-Wheel Unit Car using Alcoa Aluminum Alloys, applied to the standardized design of the Third Avenue Railways, New York.

Above (lower left) is the Brill Electric Coach; the ultra modern version of the old trackless trolley, using Alcoa Aluminum and its Alloys for practically all metal parts.

Above (lower right). An Alcoa Aluminum Brill Master Unit Car. Quiet operation, together with a large decrease in power consumption, and more rapid acceleration, are brought about by building these cars of Alcoa Aluminum and its Alloys.

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ALUMINUM COMPANY *of* AMERICA;
2463 Oliver Building, PITTSBURGH, PA.
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Thousands of daily traffic thumps actually IMPROVE *floors paved with Carey Elastite Asphalt Plank.*



Toughness . . . underfoot!

A flooring that *knits* and *heals* its bruises

Unique surfacing which steadily *improves* under the grind of heavy traffic—Carey Elastite Asphalt Plank. Dense, tough, indifferent to weather—can't corrugate or crawl. For "L" platforms and runways, for overhead and interurban grade crossings, for car and repair shop flooring—the perfect, preformed traffic surface.

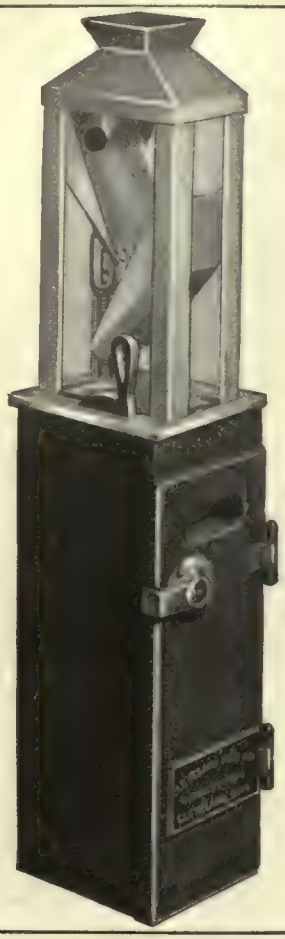
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Philip Carey Products



Spy Run Bridge, Ft. Wayne, Indiana, smooth-surfaced with Carey Elastite Asphalt Plank. Notice also that the rails are cushioned with Carey Elastite System of Track Insulation.

THE PHILIP CAREY COMPANY · · *Electric Railways Department*
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CLEVELAND FARE BOXES

The new MACDONALD *VERTICAL* MACHINE makes practical the collection of zone fares, with the aid of Fare Boxes.

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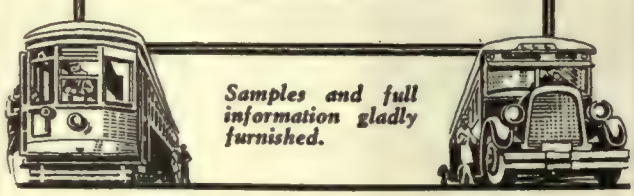
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Weather won't dim them

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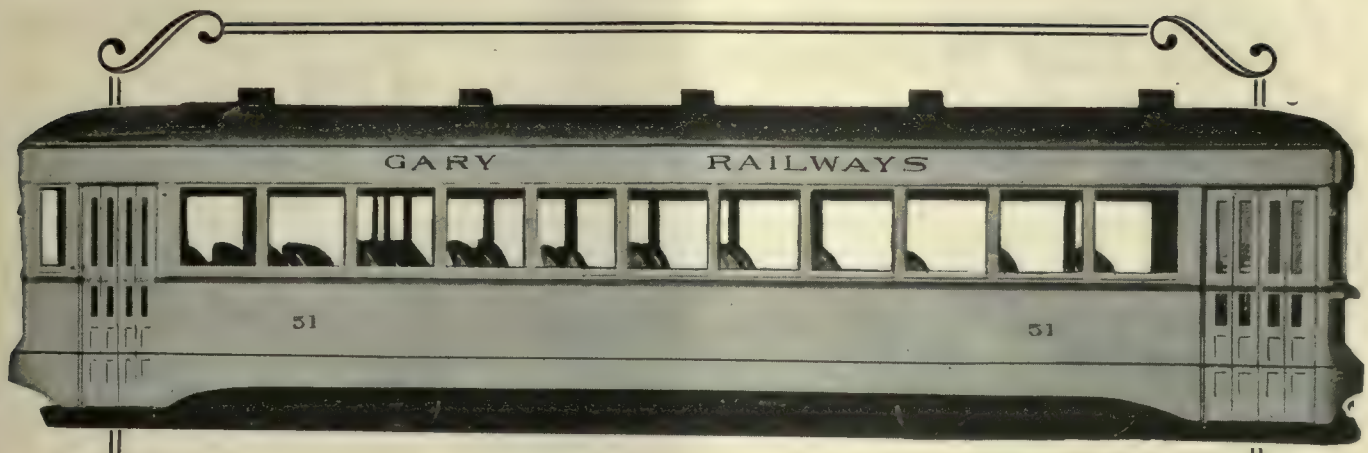
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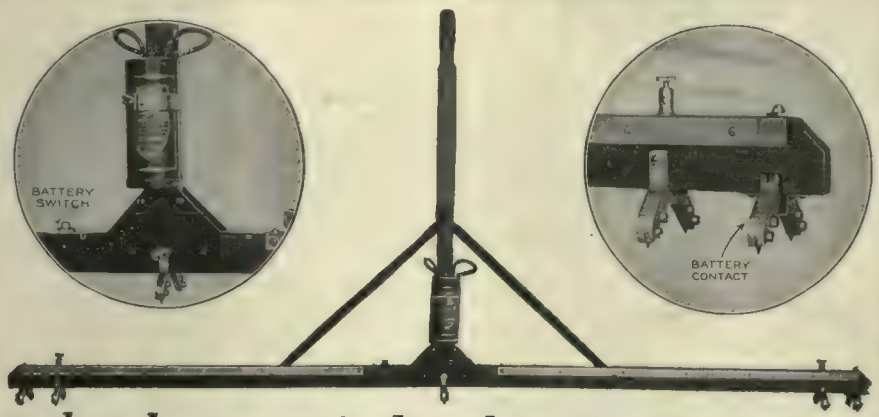
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the most important development in bond testing in years

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THE R-S Type BBT Bond Tester has over several times the sensitivity of the most sensitive bond tester heretofore made. *It can be successfully used with the current from a single No. 6 dry cell.* This dry cell and the battery switch and contacts are clearly shown in the illustration above.

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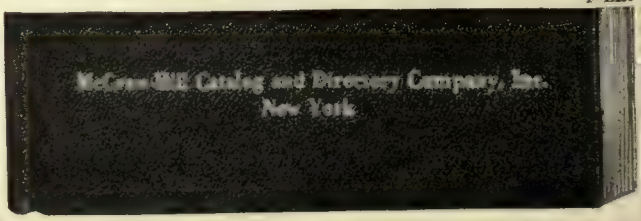
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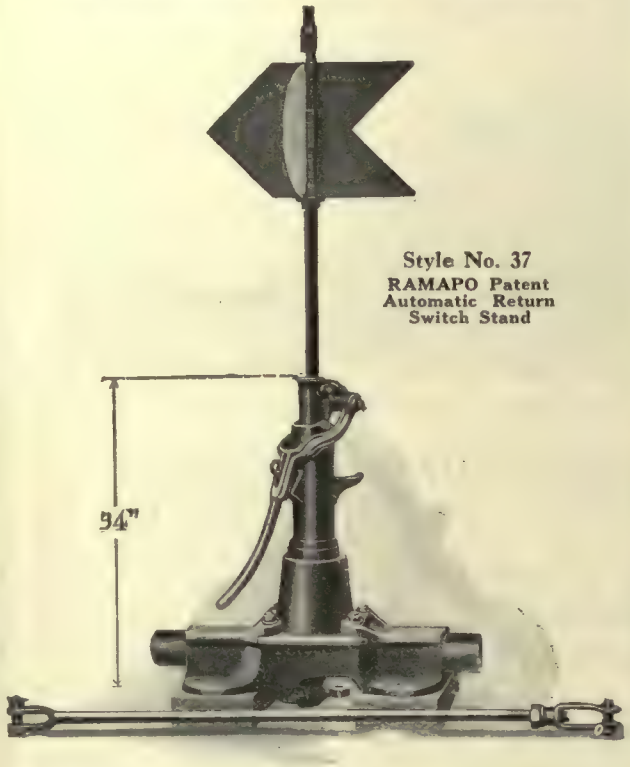
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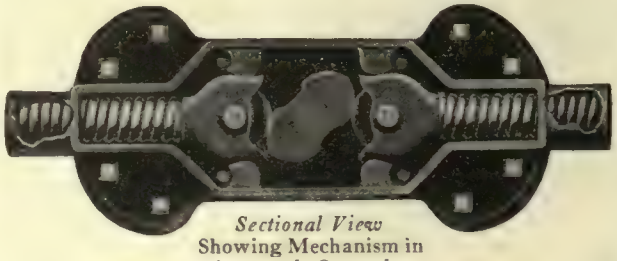
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Showing Mechanism in
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It's the maintenance crews in the shops that get to know

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They know that Kalamazoo trolley wheels give less trouble, run longer and require less attention. Is it any wonder that Kalamazoo trolley wheels and harps are standard for many properties?

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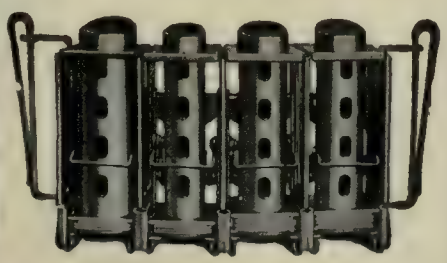


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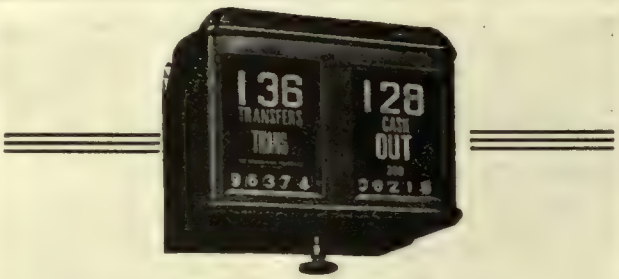
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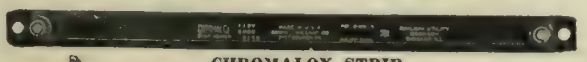
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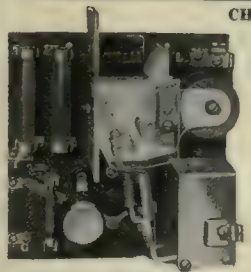
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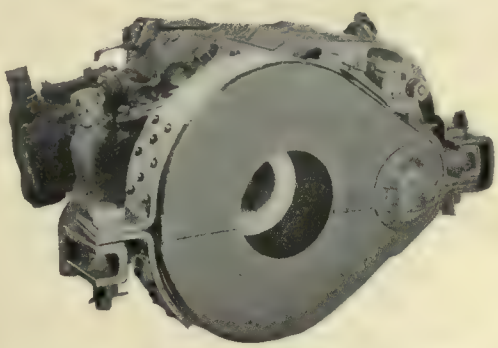
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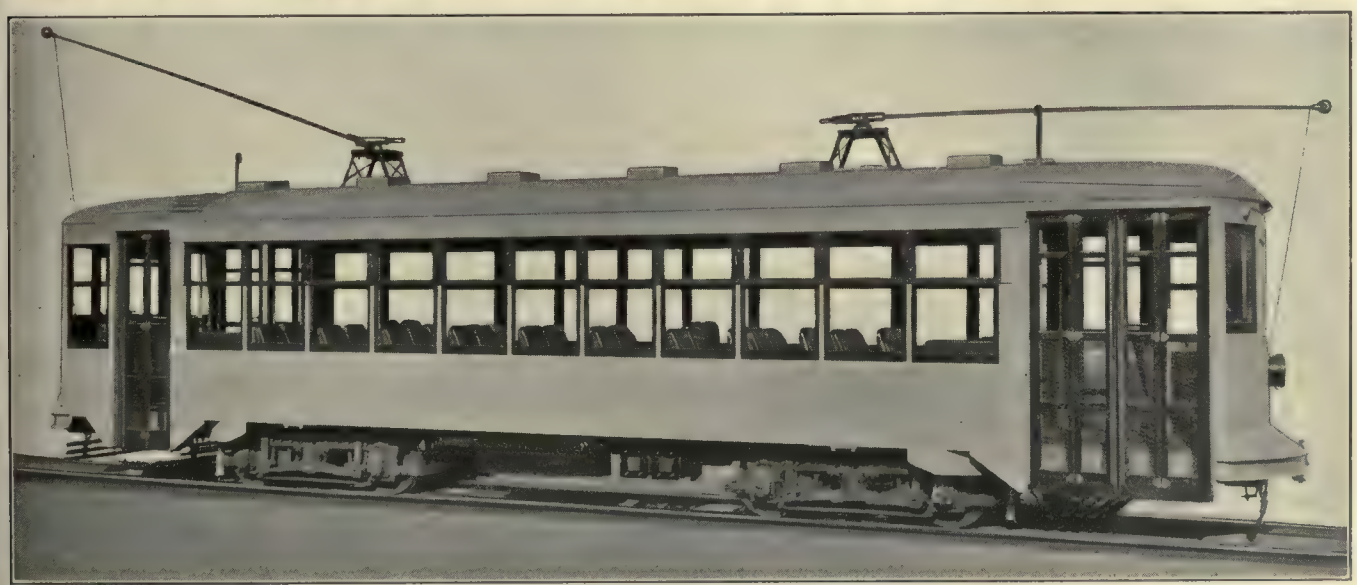
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330-146

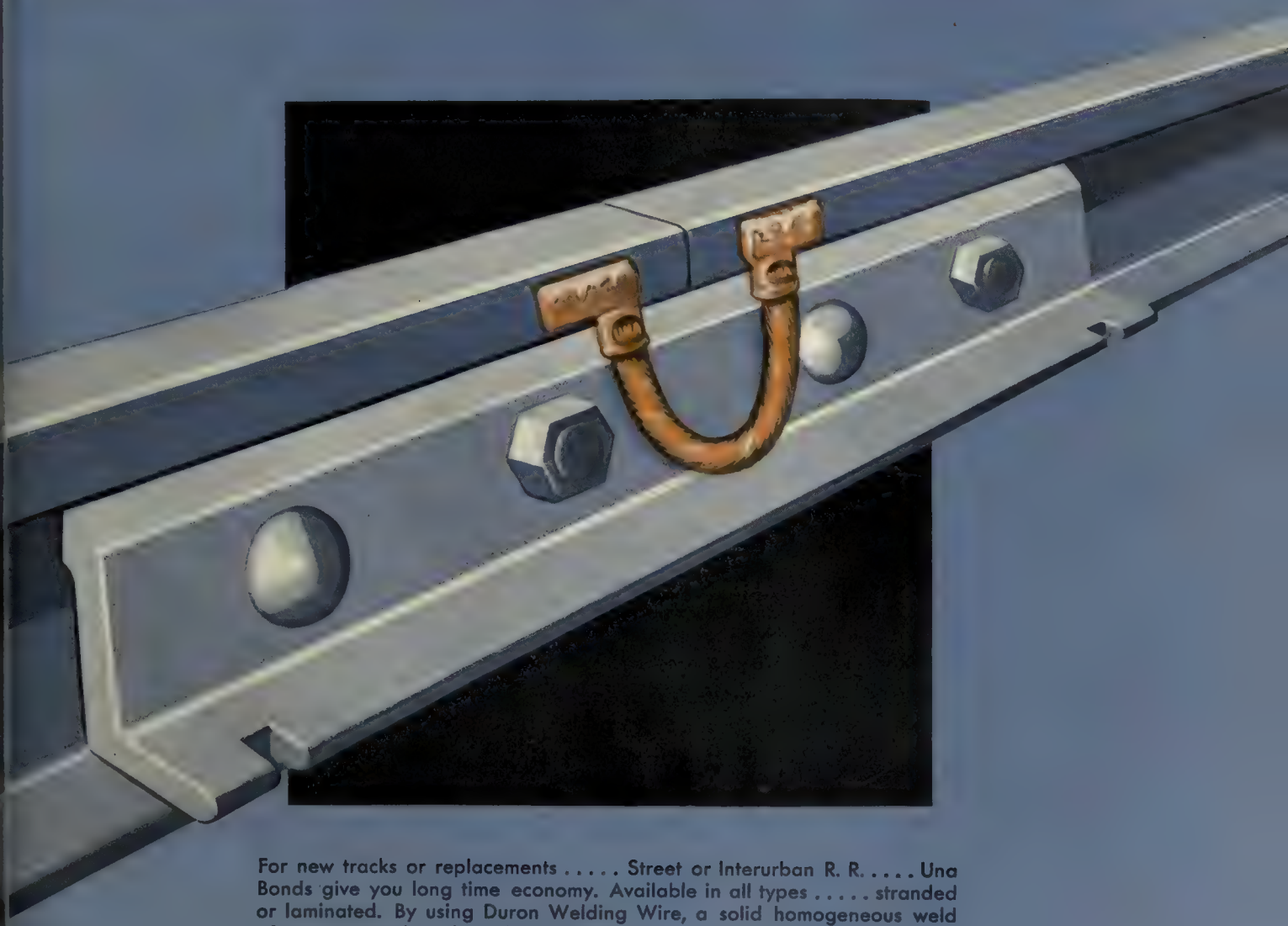
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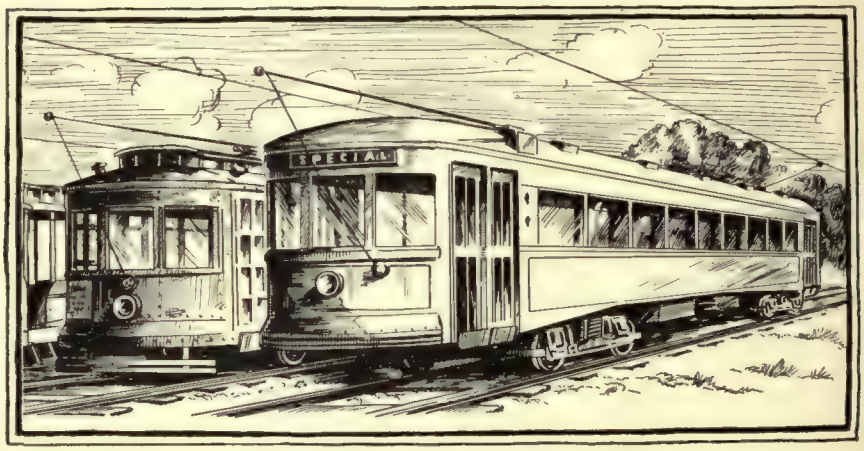
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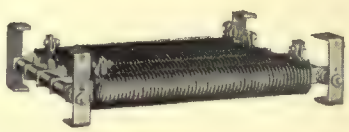
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THE most important requirement of the modern street car is that its speed be great enough to beat the traffic on the green light and to hold that position.

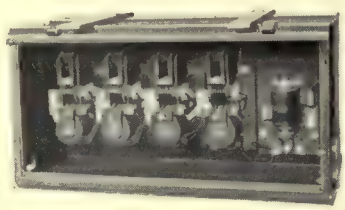
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Vol. 74, No. 4 *Pages 179-244*

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1930

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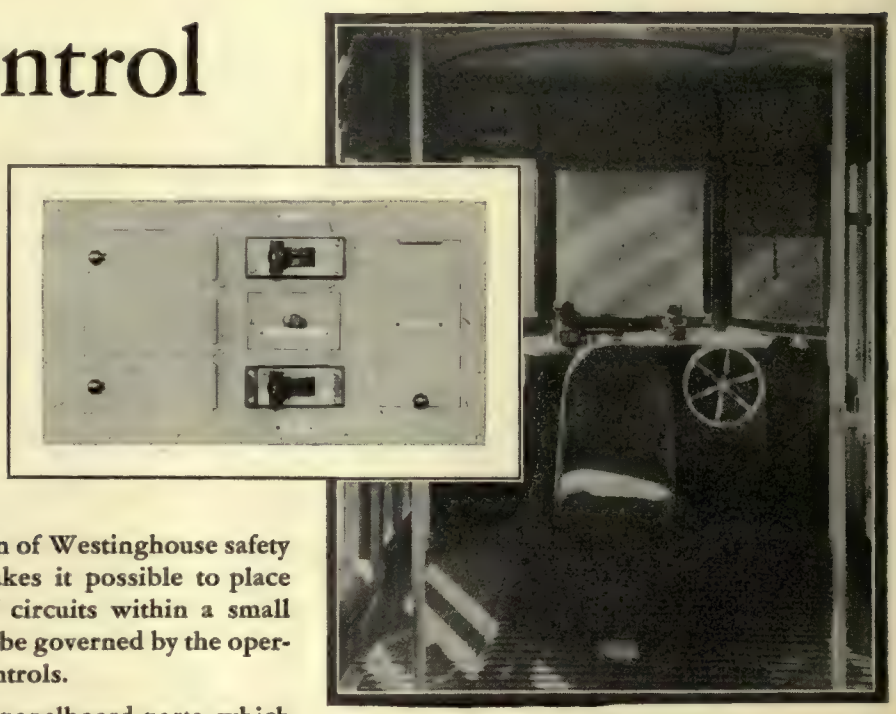
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CAR PANELS

...that Centralize Circuit Control



A typical panelboard layout in the modern street car.

THE compact design of Westinghouse safety type car panels makes it possible to place the controls for a large number of circuits within a small space. Buzzer, lights and heater can be governed by the operator without leaving his place at the controls.

These panels are built-up of standard panelboard parts, which can be assembled in various ways to meet the space and circuit requirements of each application. The neat appearance and compact design are in keeping with the trend toward better car layouts.

Full safety to the operator is provided because the doors covering the switch and fuse compartments cannot be opened when the switch is "on".

When you buy new cars or recondition your old ones use Westinghouse car panels. Their reliability has been proved in service.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

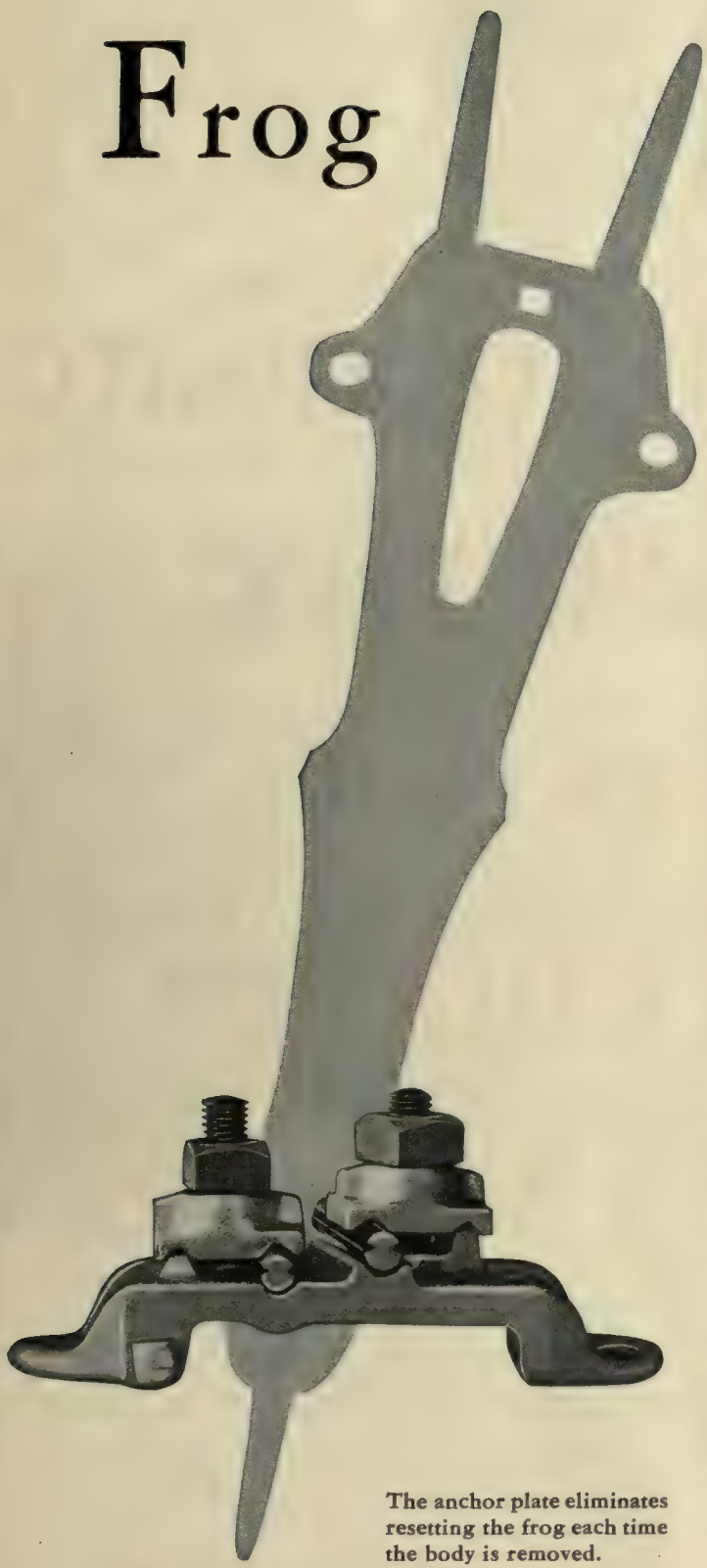
MEMBER AERA 1930

Westinghouse

WESTINGHOUSE ELECTRIC

T 31164

Frog Replacement ...*now a* ONE MAN *job*



The anchor plate eliminates resetting the frog each time the body is removed.

The type RP renewable pan trolley frog consists of a malleable iron galvanized body and a malleable iron galvanized anchor plate. The wires are clamped to the anchor plate, and the frog is hinged to it. Once the anchor plate is set correctly, it becomes a permanent fixture, and the frog body can be removed or replaced without interfering with the setting of the complete frog.

This frog is one of the recent additions to the extensive line of railway overhead equipment which Westinghouse is constantly improving in order that electric railway companies may obtain better operating economies.

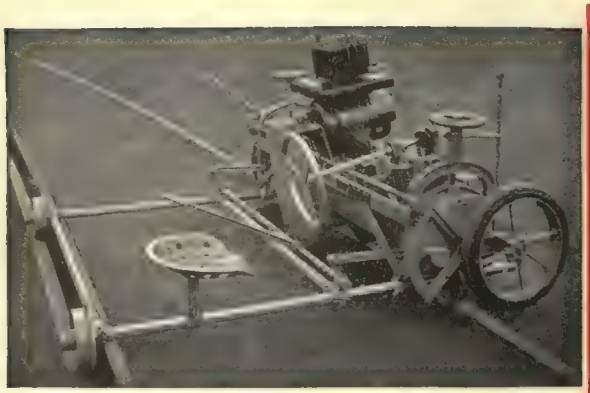
Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

MEMBER AERA 1930

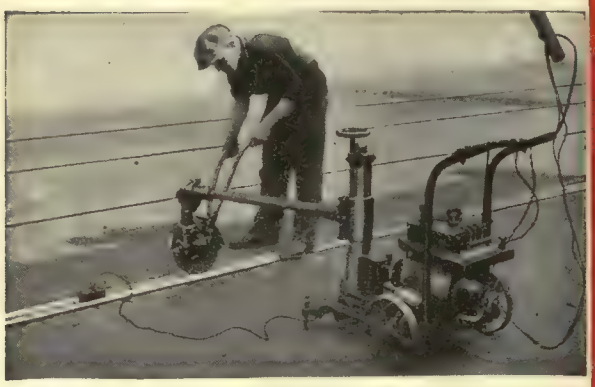
Westinghouse

WESTINGHOUSE ELECTRIC

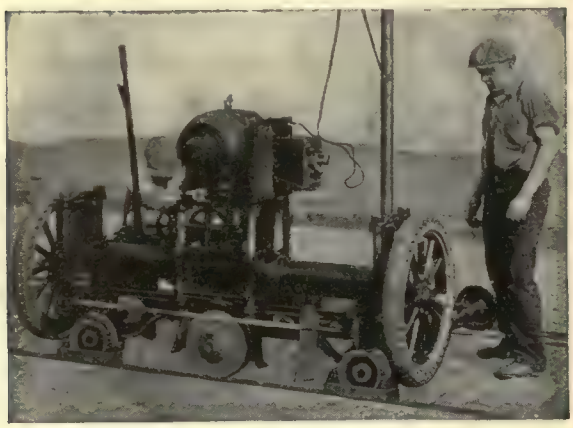
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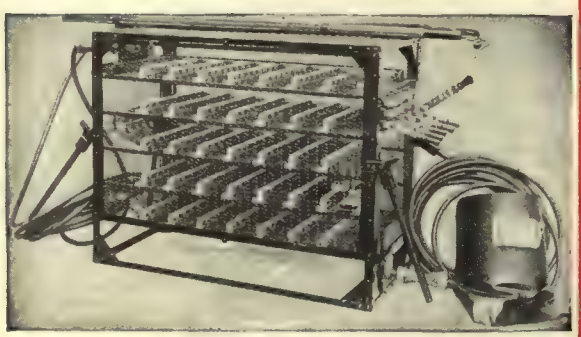
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

Adequate service is not enough

Said Mr. Paul Wilson at the C.E.R.A. meeting in January:

"Many of us are trying to render adequate service rather than attractive service."

It's a nice distinction worthy of more than passing note. Even adequate service is not enough to sell the service. It must be more—it must be attractive.

Specifically, service, to attract, must sell a swift, silent, comfortable ride. Only on good track can you meet those specifications—and it's your public that writes them.

Fortunately good track is so easy to have and so inexpensive to maintain with the equipment we sell.

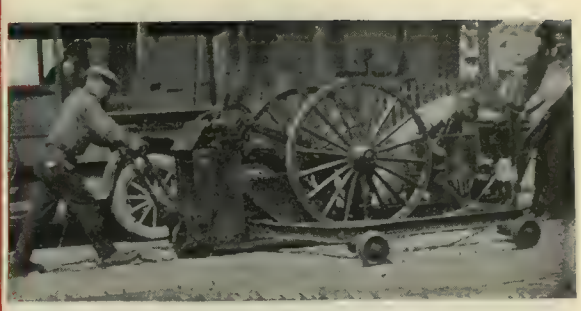
Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia

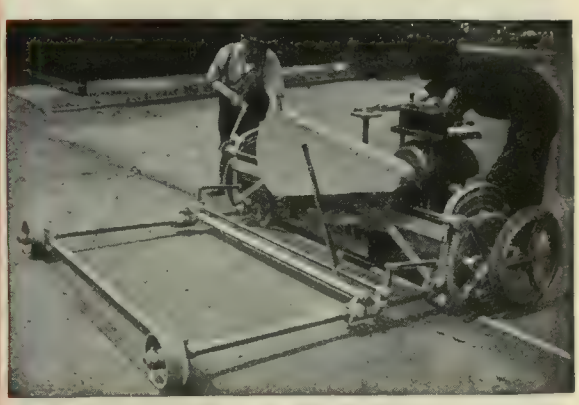
AGENTS

Chester F. Gailor, 50 Church St., New York
Chas. N. Wood Co., Boston
H. F. McDermott, 208 S. LaSalle St., Chicago
F. F. Bodler, San Francisco, Cal.
H. E. Burns Co., Pittsburgh, Pa.
Equipment & Engineering Co., London

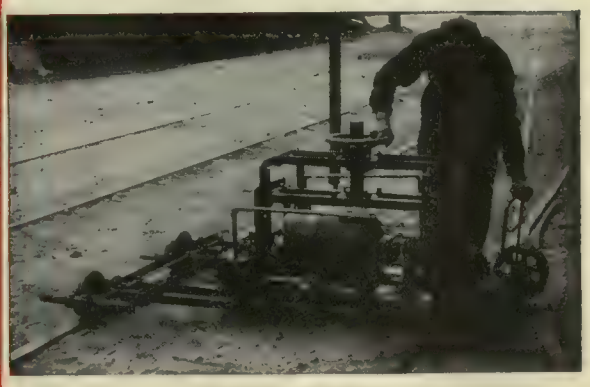
E 3384



Reciprocating Track Grinder



Vulcan Rail Grinder



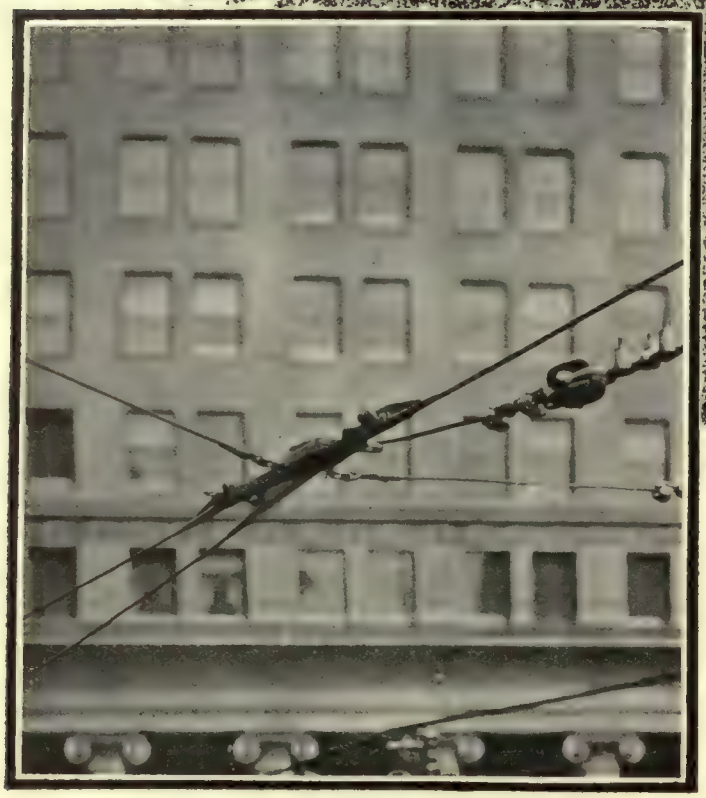
Midget Rail Grinder



RTW Curve Oiler

These Little Grow Into

For years O-B has seriously studied the factors which contribute to operating costs. As a result of this study, O-B has continuously offered the industry a great many devices designed to lengthen life and reduce maintenance —in brief to lower operating costs.



A typical installation of the O-B Duplex Frog in a large midwestern city. Service results are highly satisfactory. Observe the use of the O-B Span Grip Clamp in this installation,

Longer Service and Lower Maintenance Win New Friends Daily



Top view of O-B Duplex Frog, showing removable yoke, and manner of assembling pan and yoke.



View of pan of O-B Duplex Frog to show overlapping runner construction which increases life of frog and wheel.

THE O-B Duplex Frog is outstanding in its operating cost savings character. It is designed to provide longer life. This is effected by overlapping the runners so that the wheel does not come in contact with the pan of the frog. Current collection is better, with a marked reduction in arcing and pitting, resulting in long wheel wear as well as from 300,000 to 500,000 car passes per frog.

In addition, the O-B Duplex Frog is designed with a removable yoke, which permits complete replacement of a worn-out pan and the cam tips without disturbing the position of the trolley or span wires. This simple change is easily and *quickly* effected, as it is not necessary to use block and tackle, or respot the frog. When the yoke has been correctly "spotted" when first installed, the yoke becomes a permanent part of the overhead.

As a result of these time and money saving advantages, the O-B Duplex Frog has been chosen by alert overhead superintendents in such large cities as Boston, Baltimore, Buffalo, Cleveland, Louisville, Knoxville, St. Louis, Denver, St. Paul, Minneapolis and Montreal, as well as for scores of other properties.

Your selection of the O-B Duplex Frog; described on pages 38 and 39 of New Products Supplement No. 3 to O-B Catalog No. 20; is a step toward greater economy and efficiency in operation.

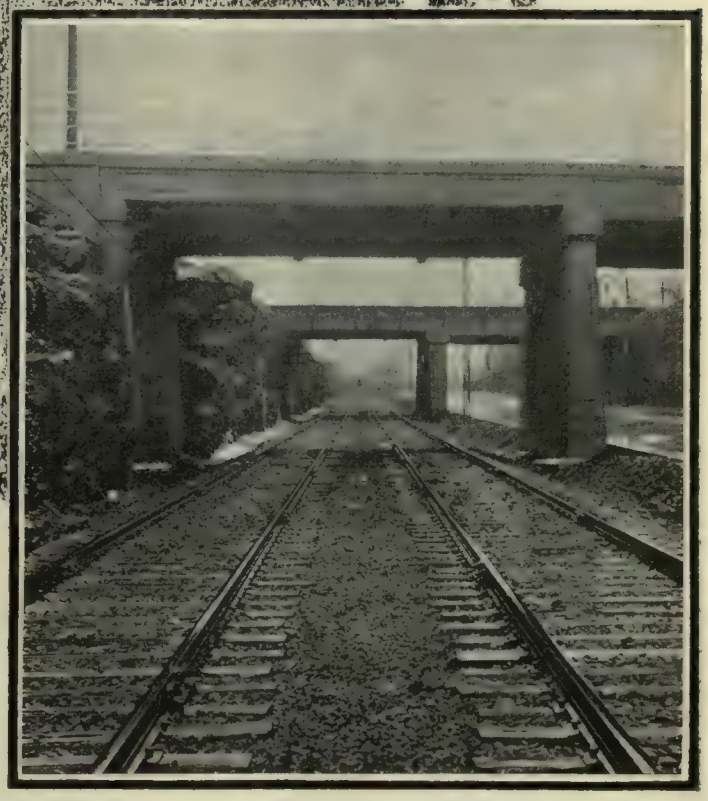
Ohio Brass Company, Mansfield, Ohio

Canadian Ohio Brass Co. Limited
Niagara Falls, Canada

1216LB

Acorns Will Big Oaks

True, each saving may be small in itself, but the aggregate makes a very substantial sum—a marked reduction in operation expense, which directly increases net profits. Thus, like the little acorn, the small savings make a total which grows like the great oak.



Reliability, Durability and Efficiency are Proved by this Bond Installation

ABOUT four years ago, shortly after its introduction, the O-B Titon Bond was selected for the rebonding of the Niagara, St. Catherines and Toronto Railway. Engineers of this property made this choice after exhaustive service tests, and because O-B Titon Bonds were performing so satisfactorily elsewhere.

Results have been as anticipated. This important property has had no trouble since installing. In fact, the photographic illustration at the right indicates probably greater service life than was originally expected.

This service is representative of the service of O-B Titon Bonds everywhere, and is undoubtedly the reason why more than 125 properties in the United States, Canada and foreign countries have chosen O-B Titon Bonds.

Installation is by copper electrode arc welding, using O-B Duron Welding Rod, to the head of the rail. An internal copper sleeve, between the copper strand and steel terminal, damps out vibration. Terminal design provides for a beveling of deposited metal from the rail, which tends to deflect wheel traffic. These two advantages, plus the superior design and construction materially strengthen service life.

If you are interested in securing a rail bond of permanent low electrical resistance and high mechanical reliability, investigate O-B Titon Bonds. Refer to page 667 of O-B Catalog No. 20.

View of right of way of the Niagara, St. Catherines and Toronto Railway. The return circuit is efficiently maintained with O-B Titon Bonds.



Close-up of O-B Titon Bond installed on track of above property.



The O-B Titon Bond, showing terminal construction. View shows the side of bond which adjoins the rail.

Ohio Brass Co.

NEW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
PHILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

Her Children Are More Critical



To our grandmothers a journey was an event. The novelty of it took the curse off many discomforts. It was a thrill merely to ride.

Nowadays, grandmother's children and their offspring go places. The ride is incidental. If railway travel is too uncomfortable, they go by some other way — usually in their own automobiles.



This Hale & Kilburn No. 392-A deep cushioned leather covered reversible seat is the one used by the Market Street Railway in San Francisco.

Wide-awake railways are doing everything to make travel supremely comfortable. Several outstanding companies are aggressively developing profitable passenger traffic. It is significant that HALE & KILBURN SEATS have been installed in the cars of those lines which are successfully merchandising comfort.

HALE & KILBURN SEATS

"A BETTER SEAT FOR EVERY TYPE OF MODERN TRANSPORTATION"

HALE & KILBURN CO.

General Office and Works: 1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York
Hale & Kilburn Co., McCormick Bldg., Chicago
Frank F. Bodler, 903 Monadnock Bldg., San Francisco
E. A. Thornwell, Candler Bldg., Atlanta
W. L. Jefferies, Jr., Mutual Bldg., Richmond
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
H. M. Euler, 146 N. Sixth St., Portland, Oregon

CHICAGO

SURFACE LINES





CHICAGO SURFACE LINES officials spent more than a year carefully investigating equipment for their feeder expansion program and then recommended the modern trolley bus as the best solution of their requirements.

THE MARCH OF PROGRESS





TWIN COACH body design, unit strength, balanced weight, patron appeal, entry and exit arrangement, low platform and general adaptability won for it better than **70%** of the orders placed by Chicago Surface Lines.

THE TROLLEY BUS *IS* HERE



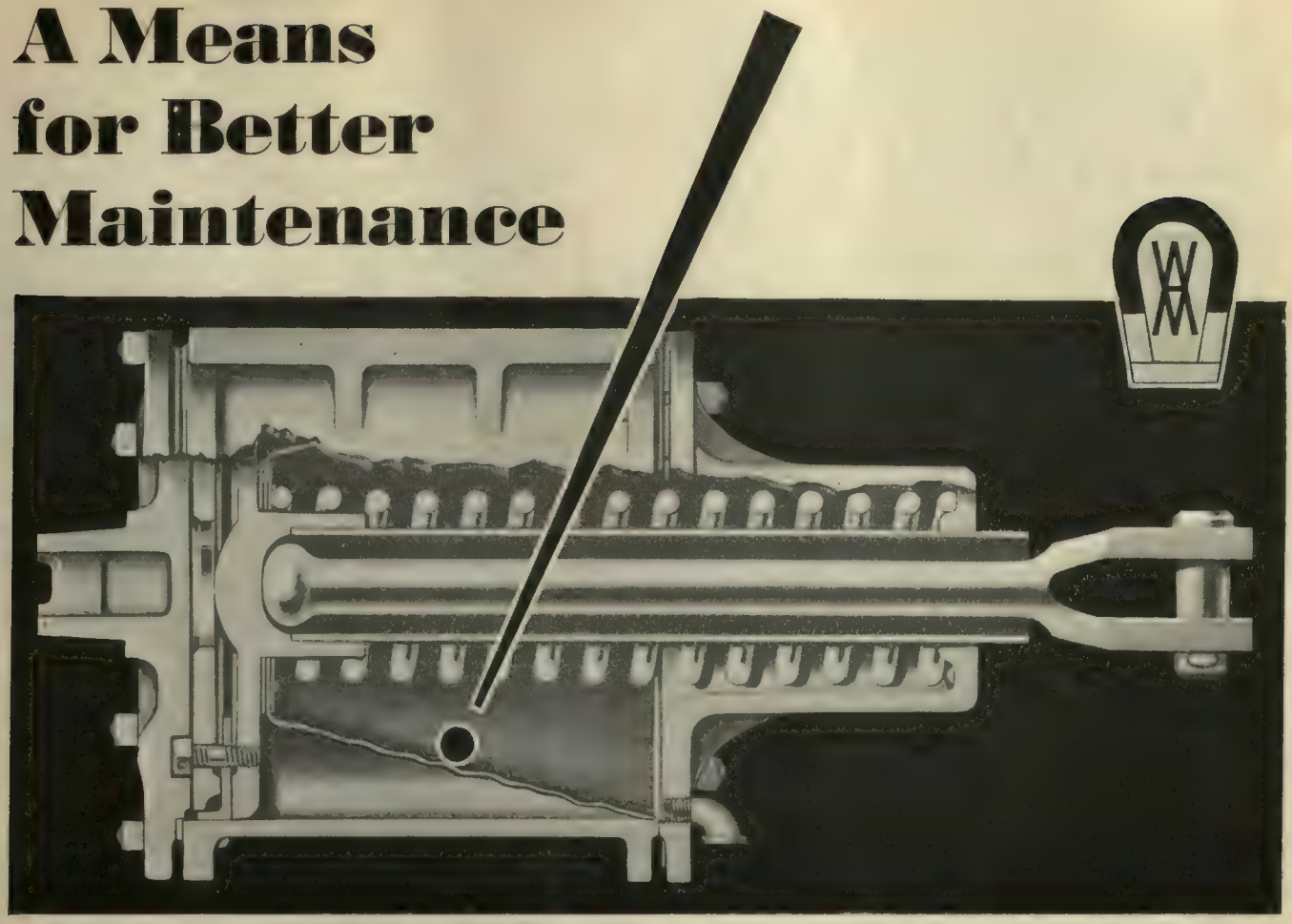
New Orleans
Twin Coach Design
Trolley Bus

Salt Lake City
Twin Coach Design
Trolley Bus

If you require a rail-less vehicle with modern body development and rider appeal the answer is—

Twin Coach
BY F.R.FAGEOL KENT,OHIO

A Means for Better Maintenance



A collapsible water-proof hood inserted in the brake cylinder as shown, is an effective means of preventing dirt and moisture that may sift in through the non-pressure head from reaching the cylinder walls . . . Keeping cylinders clean in this manner will reduce leakage, lengthen life of packing cups, and decrease maintenance expense. Many railroads are now realizing the benefits of this protector.

WESTINGHOUSE
Traction Brake Co.
General Office and Works
Wilmerding, Pa.

Safely

National Pneumatic door control equipment provides the safest, easiest and most convenient method by which passengers may enter and leave cars or buses. It is impossible for the doors to open while the car is in motion . . . it is impossible to proceed until all doors are closed. All possibility of boarding and alighting accidents is eliminated with NP equipment.



Quickly

The time required to take on and discharge passengers is reduced to a minimum by NP door control equipment. Doors are opened instantly by the operator upon coming to a full stop . . . the operator is set to start instantly when the doors close. This saving in time with NP equipment makes possible consistently faster schedules.

THE tremendous number of passengers carried daily by electric railways presents a constant loading and unloading problem. That NP door control equipment solves this problem is clearly evident by the ever increasing number of NP equipped cars and buses found in operation year after year.

NATIONAL PNEUMATIC COMPANY
Graybar Bldg., New York
CHICAGO PHILADELPHIA
Manufactured for Canada by
Railway & Power Engineer. Corp., Ltd.

The NP Automatic Treadle Exit Door maintains the "circulating load" in one man operation and passengers are provided with

The



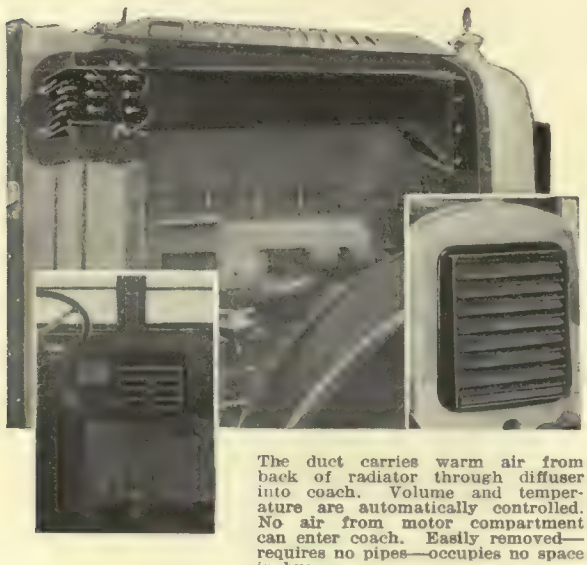
easiest way out

Announcing

A NEW AND IMPORTANT ADDITION TO THE LINE OF

Keystone Bus Equipment

MUELLER-EVANS
HEATING AND VENTILATING SYSTEM



The duct carries warm air from back of radiator through diffuser into coach. Volume and temperature are automatically controlled. No air from motor compartment can enter coach. Easily removed—requires no pipes—occupies no space in bus.

ELECTRIC Service Supplies Co. will at once take over the exclusive sale of the Mueller-Evans system of Motor Coach Heating and Ventilating System because of the many superior advantages it offers over other systems and because there is a definite need for such a system to provide fresh, warm air for bus riders. Certainly in a short time, its use must become universal.

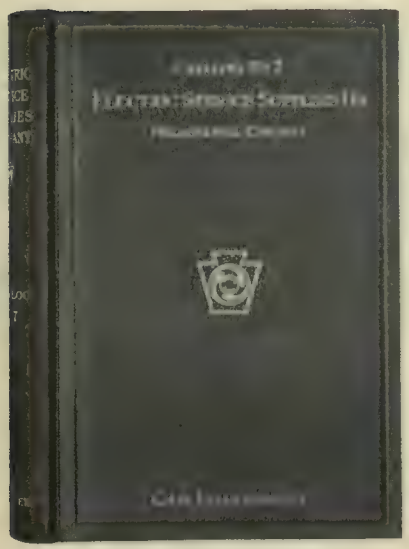
In the Mueller-Evans system—air warmed in passage through the radiator is forced through a duct into the front end of the bus and directed toward the floor. This clean, warm air provides 1200 cubic feet each hour for each passenger.

There is no odor of gasoline or oil—not the slightest trace of Carbon Monoxide. Let us send you details.

ELECTRIC SERVI

Home office and manufacturing plant located at 17th and Cambria Streets, Philadelphia, Pa.; District offices are located at 111 North Canal Street, Chicago, Ill. and 50 Church Street, New York City.

—And the Latest Catalogs on Keystone Car and Bus Equipment



Keystone Car and Bus Equipment includes the items shown below—and hundreds of other car and bus accessories.

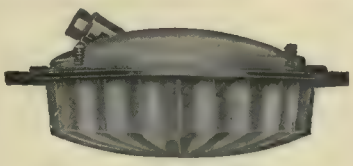
Car Equipment is listed in Catalog No. 7 and Bus equipment in Catalog No. 9.

If you do not have these catalogs—and you are purchasers of car or bus equipment—please write for the one you require.

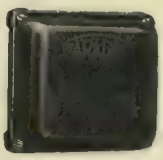




Faraday Push Buttons



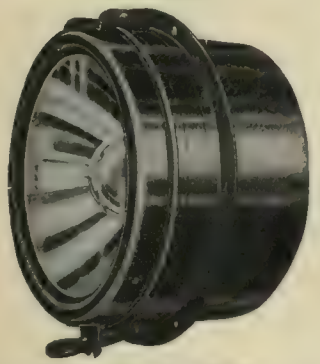
Dome Type A Keystone-Ivanhoe Fixture



Faraday Buzzers



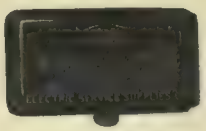
Hunter Illuminated Signs



Golden Glow Headlights



Dome Type S Keystone-Ivanhoe Fixture



Faraday Car Signal Systems



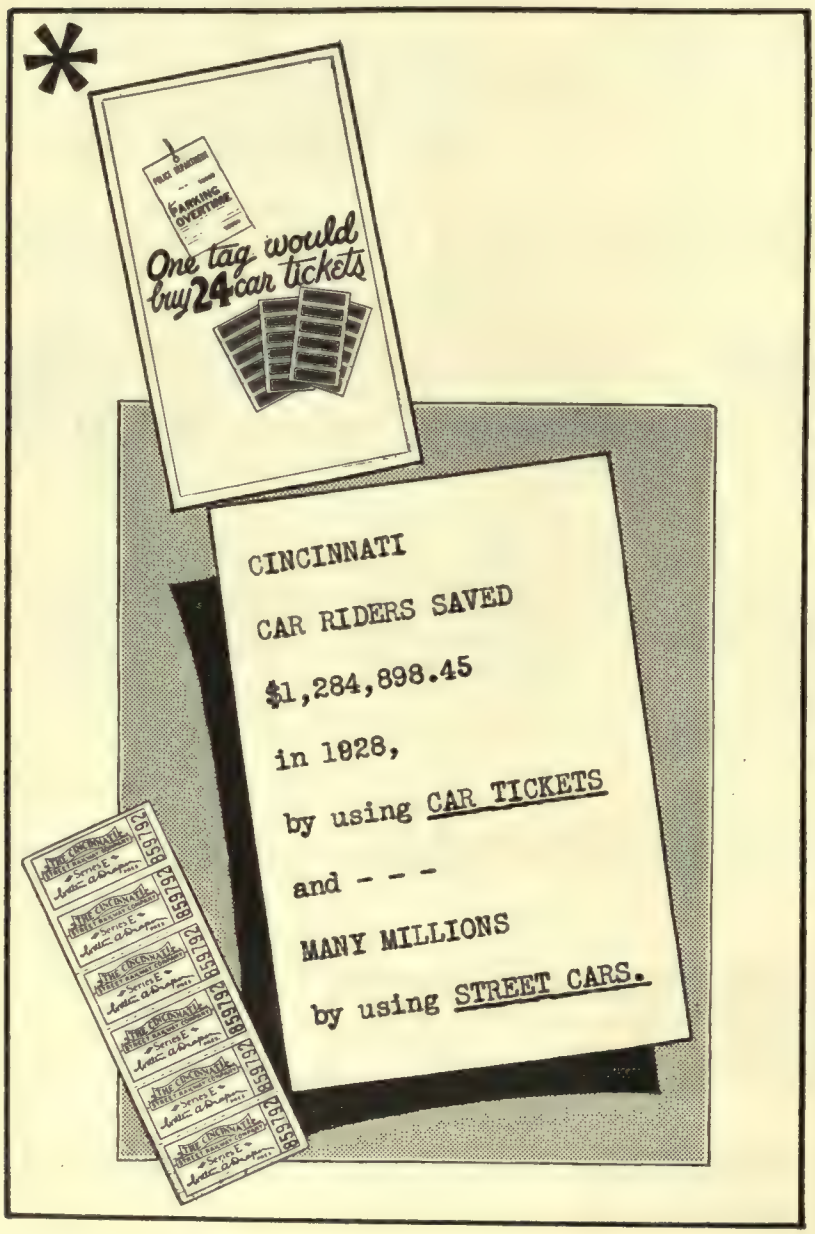
Keystone Trolley Catchers

CE SUPPLIES CO.

Branches—Bessemer Bldg., Pittsburgh; 88 Broad Street, Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents—Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

CINCINNATI *sells 'em this way-**

and Cincinnati sells millions of Globe tickets



Cincinnati car fare is 10 cents cash, three tickets for a quarter. The street railway carried 7½ million more passengers in 1927 than in 1926. In 1928 it held the gain of the previous year and added another 1½ million passengers to it. In 1929, in spite of a general decline in business, the gains of the two previous years were practically maintained. This property is firmly convinced of the value of selling bulk transportation in advance to its patrons. This is borne out by the fact that the percentage of passengers using tickets has increased until it is now 86.31 per cent.

Globe
Ticket Company
PHILADELPHIA, PA.

Offices:	*Factories:*
Syracuse	Philadelphia
Baltimore	Los Angeles
Cincinnati	Boston
Cleveland	New York
Pittsburgh	Jacksonville



G-E 1850 PAPER

You can be *sure* of G-E 1850 Insulating Paper. It doesn't carbonize, under motor operating heats. It resists moisture, and it's mechanically strong . . . doesn't split in tight slots, leaving hidden cause for later trouble.

There are no pinholes in it . . . no thin spots . . . no brittle patches.

Careful selection of pulps from all over the world, special processes, hot rolling under tremendous pressures, long manufacturing experience—in a plant devoted to this product—all these factors make G-E 1850 *super* insulating paper.

You will understand why it can add life to hard-driven motors if you will accept a sample from us. Write today to Section M-814, Merchandise Department, General Electric Company, Bridgeport, Conn.

G-E INSULATING MATERIALS

For every purpose

Varnishes, Oils, Shellacs, Paints.

Filling and Sealing Compounds.

Varnished Cloths and Tapes.

Insulating Papers.

Core Solder and Fluxes.

Cords and Twines.

Glyptal Lacquers.

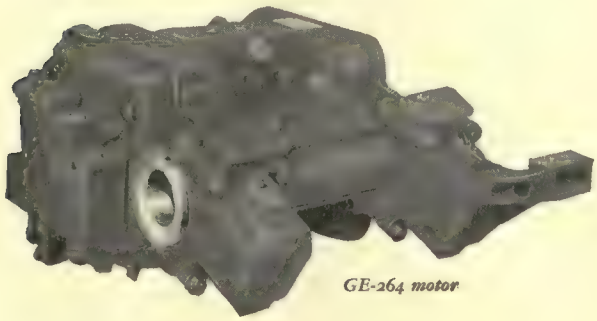
GENERAL ELECTRIC

INSULATING MATERIALS

MERCHANDISE DEPARTMENT · GENERAL ELECTRIC COMPANY · BRIDGEPORT, CONN.

The essential equipment

THE modern light-weight car is the answer to a general demand for rolling stock of low initial cost and decreased maintenance. General Electric stands ready to supply the essential equipment for this service—equipment that has in every way kept abreast of the requirements of the railway industry.



GE-264 motor

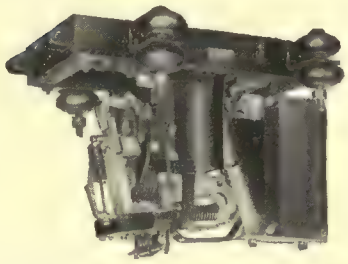
This 25-horsepower motor, GE-264, has excellent characteristics for service in light-weight cars. Several features, such as constant-oil-level bearings and ventilated cover above commutator, add to its desirability for this class of service.



Type K-75 control with LB handle

Type K-75 control with LB control handle is designed for light-weight cars. Although smaller and lighter than standard controllers, it embodies the latest improvements including hinged-type control fingers. The LB handle, which provides for opening and closing of the control contacts before the drum is moved, confines practically all arcing to the line breaker; all heavy currents are opened under the car.

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK



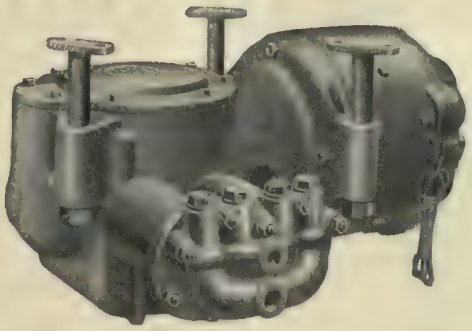
Type DB-986-A line breaker (cover removed)

G-E line-breaker equipment not only prevents a large percentage of the arcing that would otherwise occur in the controller, but it also protects the equipment from short circuits and overloads above a predetermined value. A substantial reduction in maintenance costs is thus made possible.

GENERAL

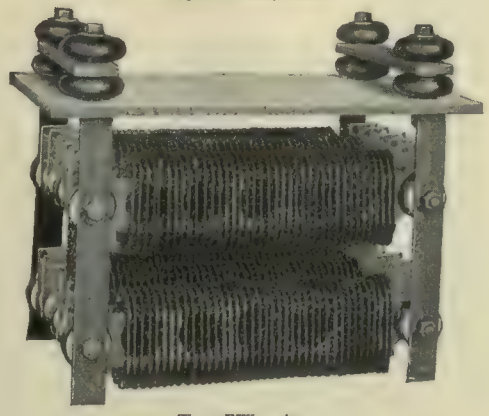
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

for light-weight cars



Type CP compressor

Type CP motor-driven compressors for air-brake service are the result of long experience in the design and manufacture of reciprocating air compressors. The many features that contribute to the reliability and long life of these units are of interest to every operator.



Type EW resistor

Exposure to the elements does not affect the Type EW resistor, because the units are made of special non-corrodible alloy; nor will vibration break it, because the alloy is flexible and has a high tensile strength. It weighs but half as much as a grid-type resistor of the same capacity.

-and if you want fast acceleration



GE-301 motor

The GE-301 motor (50 horsepower) was developed to meet the demand for fast acceleration in large cities where cars of greater seating capacity are required. This motor is provided with four commutating poles (unusual in a motor of this size) and constant-oil-level bearings.



PCM control (cover removed)

PCM control provides automatically smooth, fast acceleration without discomfort to passengers. It has the largest number of steps available in any control and yet the construction and operation are simple. Ask for complete information concerning this modern device.



G-E magnetic track brakes

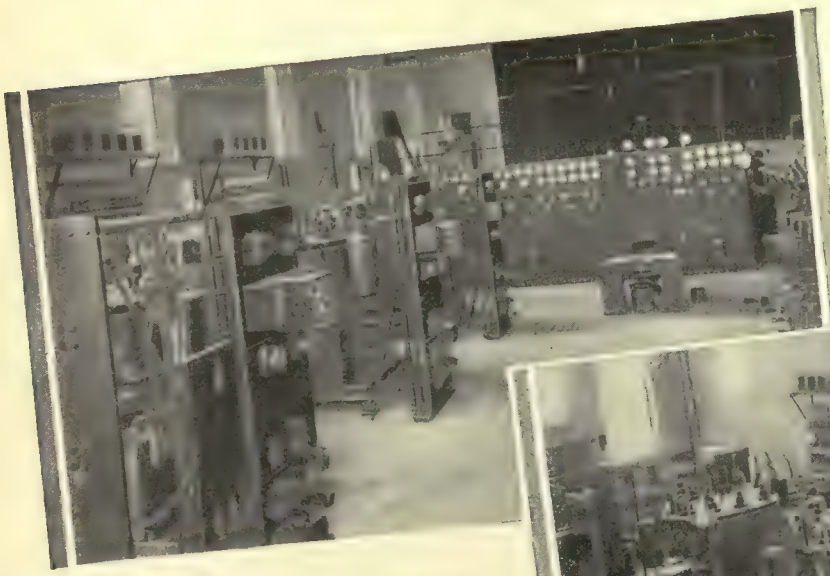
Magnetic track brakes are designed to increase safety in traffic. They provide the ability to stop quickly regardless of rail conditions and are a valuable aid to the maintenance of fast schedule speeds through heavy traffic areas.

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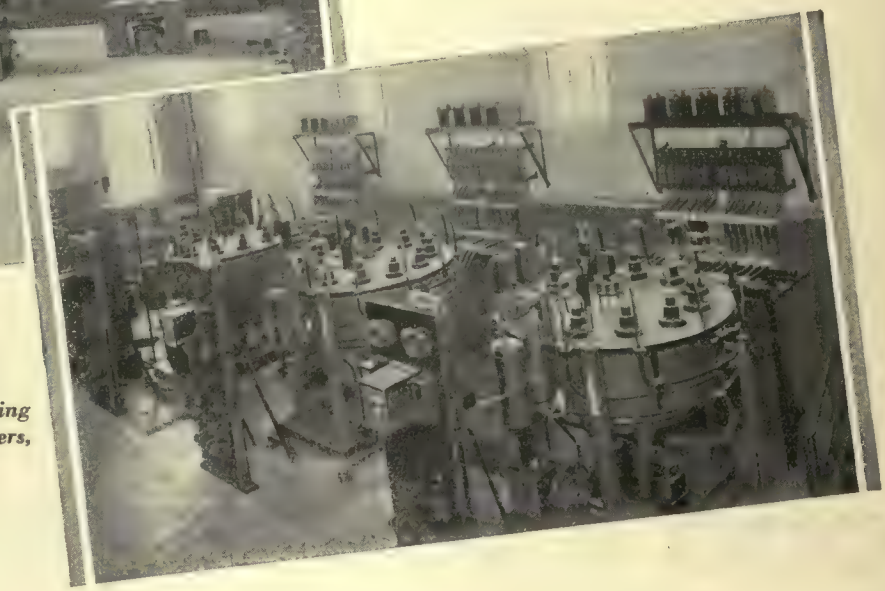
ELECTRIC

SALES OFFICES IN PRINCIPAL CITIES

G-E mercury-arc rectifiers demonstrate their flexibility



Interior view of Fall River station showing control panels



Interior view of Fall River station showing three General Electric mercury-arc rectifiers, each of 1,000-kw. capacity

—this station converts either 25- or 60-cycle power

OF UNUSUAL interest is the installation of G-E mercury-arc rectifiers at the Fall River substation of the Eastern Massachusetts Street Railway Company. Normally, these rectifiers utilize 25-cycle power at 13,200 volts. However, the equipment is so designed that in case the 25-cycle power is interrupted, 60-cycle power at 22,900 volts can be substituted instantly. Other G-E equipment at this station includes transformers and complete manual switchgear.

The reliability of G-E mercury-arc rectifiers has been proved again and again through years of railway service. Your interest is invited. Address the nearest G-E office or General Electric Company, Schenectady, N. Y.

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

130-22

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 74 New York, April, 1930 *Number 4*

Improvement Plans Go Forward

DETERMINATION on the part of electric railway executives to carry out their full program of expenditures for improvements during 1930 remains unshaken. They believe that there is nothing in the present general business situation to necessitate any curtailment of their new equipment, construction and maintenance budgets. Expenditures planned by the industry for these purposes total more than $371,000,000. This was indicated by the survey appearing in the Annual Statistical Issue of ELECTRIC RAILWAY JOURNAL, published early in January.

But that was three months ago. They have been three months of economic uncertainty. Business trends have been hesitant. Electric railway traffic has declined sharply. To determine what effect, if any, these conditions might have on the improvement plans of the industry, this paper made a telegraphic survey covering railways in most of the principal cities in 27 states and Canada, as well as a considerable number of interurbans. Practically without exception these companies replied that they intend to carry out their program of extensions, betterments and maintenance as originally planned. "No reduction in expenditures contemplated," "See no reason to change our plans," "Our company is carrying out full program of expenditures," are typical of the answers received. Detailed results of the survey are given in an article appearing elsewhere in this issue.

Preliminary steps have already been taken to carry out these improvement plans. Orders for more than 250 new cars have been placed since the first of January and announcement has been made of the prospective purchase of 200 additional cars in the near future. Approximately 500 new buses have been ordered by the electric railways during the past three months, with the purchase of 150 more pending. Activity has been evident also with respect to trackless trolleys. Orders have been placed for 41 of these vehicles, with the purchase of 100 more under consideration. Track construction, of course, is a seasonal activity. The work for this year is only just beginning. Orders placed for track material indicate that the electric railways are practically ready to begin the execution of extensive construction programs. Materials for the maintenance and construction of overhead line and power equipment also have been purchased in volume, indicating that activity in this department will not lag.

Expenditures made during the first three months of this year for new equipment, construction and maintenance represent only a relatively small part of the annual budget. During the next six months improvement plans will be pushed more rapidly. Electric railway men feel entire confidence in the fundamental soundness of the economic situation and in the continuing need for public transportation service. They are going forward with this program of extensions and betterments. This the JOURNAL's survey definitely substantiates.

Transportation Salesmen Who Wear Overalls

WHILE the first contact made by a transportation company's patron is with the operator of the vehicle in which he is riding, an effective merchandising program must go far deeper than that. Important as it is to have neatly dressed, competent and courteous operators, it is equally important to have shop foremen and carhouse employees who measure up to their responsibilities. Train crews may be letter perfect in the performance of their duties and well versed in all the requisites of ride salesmanship, but the effect will be nullified if the cars themselves are dingy, dirty and noisy. Merchandising, in fact, begins in the shops and garage.

Poorly maintained rolling stock prevents successful merchandising in two ways. Cars and buses are the show windows of the local transportation industry. By their appearance, they attract or repel potential customers. Even strangers in a city, though they may not patronize its local transportation system, often gain a lasting impression of that city from the appearance of its street cars. Equally important is the fact that the vehicle operators themselves have little enthusiasm and interest in salesmanship unless they have worth-while service to sell. Just as surely as the craftsman must have proper tools if he is to perform good work, so too must the operator have a clean, well-maintained vehicle if he is to render good service. The shopman in his overalls is a salesman of transportation just as much as is the operator in his brass-buttoned uniform.

Putting Maintenance on a Production Basis

UNIT replacement has been generally accepted in many industries as the most efficient system of equipment maintenance. This system is akin to the mass production methods which have been instrumental in lowering manufacturing costs. Although the electric railway industry as a whole has been slow to adopt this practice the properties where it is followed are convinced of its effectiveness.

By centralizing the overhaul and repair of equipment parts, the unit replacement system results in better work being done at lower cost. On many railways it is customary to do minor overhaul work at the various carhouses whenever inspection discloses the need for it. Costs are higher when work is done in the individual

overhaul shop, and the time required for inspection and repair is considerably increased over that required under the unit replacement system. Centralization permits overhauling to be done at a steady rate by trained specialists working at maximum efficiency all the time. Moreover, the installation of modern machinery can be justified when it is kept in steady operation. This in turn results in further economies.

Another advantage of unit replacement is the reduction in the length of time required to overhaul a car. With the old system of bringing the car into the shop, stripping it of its equipment, overhauling each of the individual parts and then reassembling them, a period varying from three to twenty days is required. This represents a long term of inactivity during which the car is earning nothing. With the unit replacement system it is possible to bring in a car for overhauling, replace old parts with repaired parts, and get the vehicle back into service again much more quickly.

Of paramount importance, also, is the encouragement which the unit replacement system gives to preventive maintenance. With this system it is possible to overhaul spare parts at a central point and distribute them among the various operating stations so that worn parts can be replaced at the regular inspection periods. The presence of extra equipment which can be easily subsituted for a suspected part encourages such substitution rather than the policy of "taking a chance" that such a part will last until the next inspection. Other advantages of the unit replacement system worthy of serious consideration are the closer supervision of overhauling work and the keeping of more accurate equipment records.

Perhaps the hesitancy on the part of electric railways to adopt this procedure has been due to the additional investment required to keep on hand the necessary extra equipment. While it is true that the unit replacement system requires at the beginning an additional investment in extra equipment, it permits a substantial reduction in the amount of repairs material which must be kept on hand at the operating stations. Regardless of the matter of investment, however, experience shows that this system is effective in preventing rolling stock failures in service. Undoubtedly the cost of such breakdowns, measured in public good will as well as in actual dollars and cents expenditures, is far greater than the cost of keeping on hand the extra equipment.

Junk Piles—Monuments to Progress

"JUNK is a horrid word," to paraphrase a current advertisement, and a junk pile is seldom good to look at. But, according to no less an authority than Dr. Julius Klein, Assistant Secretary of Commerce, these piles of discarded machinery, of cast-off equipment, are impressive monuments to American progress. They are in sight because progressive managements prefer to have the junk outside the factory instead of inside and in use.

Generally speaking, the progression to the junk pile is accelerated by a desire to have in use only such equipment as will render satisfactory and economical service. Thus obsolescence rather than complete destruction of usefulness is the measure that determines when retirement is desirable—and necessary—if the business is to be conducted economically. Obsolescence indicates progress. It also indicates careful management, for equipment is seldom if ever discarded until an analysis has proved that the move is a wise one.

In the electric railway industry, a survey made by this paper a few years ago showed that 40 per cent of the machine tools in use were 20 or more years old. There is no indication that this proportion has changed materially. Another survey by this paper showed that 34 per cent of the passenger cars were more than 20 years old. Today there is an even greater proportion of old cars. While these pieces of animated junk will function after a fashion, it is self-evident that they cannot do the work of equipment designed today for today's need. Now is the time to build our monuments to progress by consigning the junk to the junk pile, where it belongs.

Interstate Bus Regulation Advanced

WITH the passage of the Parker bill by the House of Representatives on March 24 an important step was taken toward the regulation of interstate bus operations. Legislation on this subject has been under consideration by Congress since 1925, shortly after the United States Supreme Court decided that under the existing law neither the individual states nor any federal agency possessed authority to regulate this form of transportation. The situation created by the absence of regulation has been of direct concern to the electric railways, both from the standpoint of their own operations and those of their competitors. While general agreement has long existed among interstate bus operators that regulation of some sort was desirable, differences of opinion concerning certain details, and opposition from various sources outside the ranks of the operators have resulted in protracted delays.

In its present form the Parker bill empowers the Interstate Commerce Commission to supervise the interstate operation of passenger buses, acting through the state regulatory bodies where not more than three states are involved and with discretionary authority to refer cases to state bodies where more than three states are involved. The authority granted includes regulation of rates and fares and the requirement that the bus lines file liability insurance or indemnity bonds.

Buses are to operate under certificates of convenience and necessity, with regular routes and fixed termini. Operation of interstate buses on March 1, 1930, is to be considered *prima facie* evidence of convenience and necessity. This date is a change from that originally fixed in the bill, which was Jan. 1, 1930.

Some opposition was voiced to the passage of the bill on the ground that it would tend to stifle competition and create a monopoly. Obviously this argument has little merit as practically all states have laws governing intrastate transportation of persons by motor carriers, and the enactment of the proposed legislation is merely an extension of this principle to a type of operation which has heretofore been without adequate regulation. With a view to overcoming this objection, however, an amendment was made to the bill on the floor of the House providing that no consolidation, merger or acquisition of control should be approved if more than one of the groups involved was directly or indirectly engaged in railroad transportation.

The next step will be the consideration of the Parker bill by the commerce committee of the Senate. It is expected that the committee will conduct hearings before making any recommendations. While this will necessarily result in some additional delay it is to be hoped for the stability of the bus industry that favorable action will be taken at this session.

Hidden Assets

FEW, indeed, of the millions of passengers who ride the electric railway cars every day have any realization of the far-reaching organization required to provide the safe and dependable service which they use. They would be amazed to know that on a property of average size, more than 8,000 different items must be kept constantly on hand in the storeroom in order to assure the reliability of the service. The amount of money tied up in these materials and supplies averages nearly half a million dollars, or about 5 per cent of the annual gross receipts. For the industry as a whole, a survey published elsewhere in this issue shows that there is a total investment of approximately $72,500,000 in materials and supplies kept in stock.

In this survey figures were secured from 42 electric railways of varying sizes in the United States and Canada, representing in the aggregate about one-quarter of the entire industry. Considerable variation was shown between the large and small companies, and also between different companies of the same approximate size. In general, however, the reports showed remarkable uniformity, and the averages of the large, medium-size and small groups, furnish a series of convenient yardsticks by which to measure the conditions on an individual property.

The survey also showed that there is a decided trend today toward buying in small lots at frequent intervals rather than in occasional large quantities. Most of the railways are following this practice, but not overlooking the price inducements offered for quantity purchases. The general rule appears to be that smaller amounts are bought unless the savings accruing from quantity purchase exceed the interest on the extra investment.

In the past few years standardization has been responsible for many substantial reductions in the quantity of materials and supplies kept in stock. This has been done by co-operative effort of the industry as a whole, and also by standardization on individual properties. Further progress in this direction is to be expected, but despite everything that can be done, the materials and supplies kept on hand to insure the continuity of service will always remain a "hidden asset" of enormous importance.

Electrification Proceeding on Its Merits

INDICATIVE of the modern viewpoint in transportation circles which looks toward making the maximum use of the plant is the present activity in the field of steam railroad electrification. Thirty years ago, when electrification of main trunk lines was first proposed, the principal claim in its favor was economy of power supply as compared with steam. While the arguments advanced were valid enough, comparatively few installations were made for this reason. A more important factor was the impracticability of using steam in special locations, such as metropolitan terminals or tunnels. A number of years later, when the terminal installations had given ample proof that electric power was not only able to replace steam, but under certain conditions was doing things that steam never could accomplish, more roads began giving serious consideration to electrification.

Today the use of electric power is being extended rapidly. The Pennsylvania, a pioneer in electrification, will within a few years have the most comprehensive heavy installation in the world. The suburban electrifications of the Lackawanna in New Jersey and the Reading in Philadelphia are looked on merely as forerunners of much greater projects. Even the Cleveland terminal electrification, now about to start operation, appears to be only a step in the ultimate conversion of a large section of the New York Central.

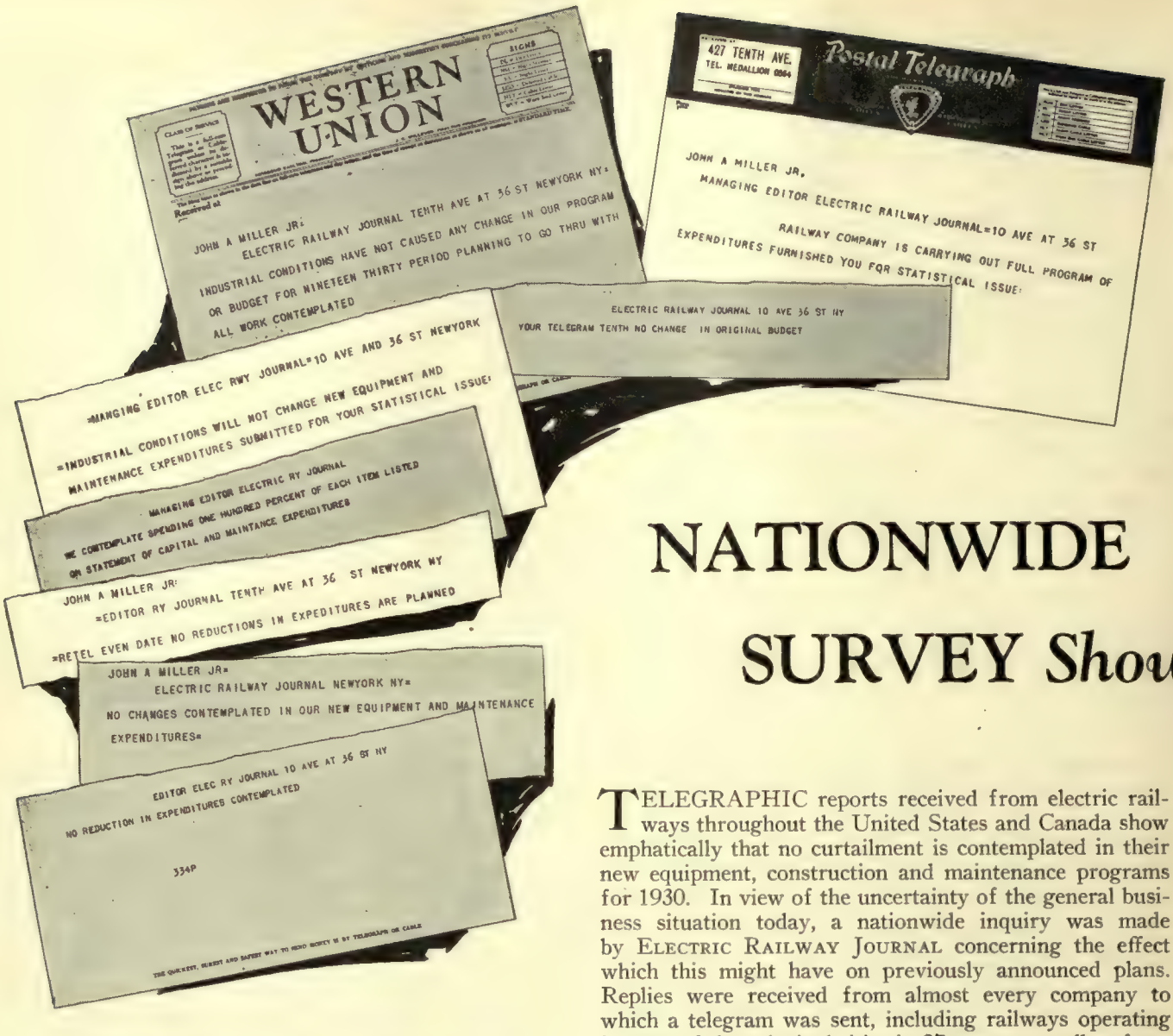
Two of these new installations, the Pennsylvania, which is a heavy trunk line system, and the Reading, which for the present comprises suburban service only, are being made with 11,000-volt single-phase alternating current. The other two are being made with 3,000-volt direct current. The Cleveland Union terminal electrification will handle heavy trains while the Lackawanna for the time being will use multiple-unit suburban trains only. Thus it appears that the sponsors of both systems consider them entirely suitable for practically all classes of electrification. It is quite significant that there are so few limitations to the type of supply that will give satisfactory service. To some extent, however, this wide choice has tended to retard rather than help the progress of electrification both in this country and abroad.

It is needless to recount the advantages of electricity. They are now well known to railroad men who have been following developments. With increasing use new advantages are being discovered which scarcely could have been predicted before any comprehensive installations had been completed. Accordingly the new electric roads are being watched with great interest. Their success is a foregone conclusion.

A Professor Speaks

IDEAS that have long been held by electric railway men received new emphasis from the clear and forceful presentation made by Prof. Winthrop M. Daniels at a recent meeting of the New England Street Railway Club. Problems of transportation have occupied the attention of Professor Daniels for many years. His conclusions deserve consideration. When, speaking of street traffic conditions, he said that "we are now engaged in the almost hopeless task of trying to force a 3-in. stream through a ½-in. nozzle," he created a picture the vividness and accuracy of which must appeal to every thinking person. Changing the metaphor, he pointed out that the arteries of local traffic in central shopping and business districts are suffering from high blood pressure. His listing of schemes which are merely palliatives, or which involve prohibitive expense, was extremely helpful.

Though there is a "no man's land" where competitive rivalry is acute between the private automobile and the public transportation agency, he believes that there is a definite core of traffic which can be handled only by the latter. In congested districts electric railway traffic represents the major movement and should receive dominant consideration. The convenience of the few as represented by parking and similar uneconomic uses of street space must give way to the convenience of the many as represented by the traffic on public transportation vehicles. At present the satisfactory operation of the electric railways is being seriously impaired by congestion. The railways cannot afford to sit back in the hope that this difficulty will be self-corrective. Only when they militantly, but without asperity, insist that their right is paramount, will they be able to operate satisfactorily. This they must do not in their own interest alone, but in the interest of the public as a whole.



NATIONWIDE SURVEY *Shows*

Typical Statements Concerning Improvement Plans for 1930

No changes in budget figures. Full expenditures expected.

Industrial conditions will not change new equipment and maintenance expenditures.

No reductions in expenditures are planned.

Have made no change in budgeted amounts for new equipment and maintenance expenditures.

No change on our property.

We do not anticipate any change in our budget for 1930 on account of industrial conditions.

See no reason to change our plans.

No change contemplated in our new equipment and maintenance expenditures.

Present industrial conditions will not affect contemplated expenditures for new equipment and maintenance.

There has been no change in our contemplated budget for 1930.

We do not anticipate any change in new equipment and maintenance expenditures.

No reduction in expenditures contemplated.

TELEGRAPHIC reports received from electric railways throughout the United States and Canada show emphatically that no curtailment is contemplated in their new equipment, construction and maintenance programs for 1930. In view of the uncertainty of the general business situation today, a nationwide inquiry was made by ELECTRIC RAILWAY JOURNAL concerning the effect which this might have on previously announced plans. Replies were received from almost every company to which a telegram was sent, including railways operating in most of the principal cities in 27 states, as well as from a considerable number of interurban lines. The territory covered extends from Maine to California and from Canada to the Gulf of Mexico, with intervening areas covered approximately in proportion to the extent of electric railway operations. Practically without exception these railways state that they intend to carry out the full program of improvements specified in the confidential budget figures submitted last December for the Annual Statistical Issue of this paper. The wide geographical distribution of the railways replying to the inquiry, as well as the variety of business and industrial conditions existing in the territories they serve, assures the reliability of their reports as an index of what may be expected during the year.

Typical of the spirit of the replies is the statement of J. N. Shannahan, president Omaha & Council Bluffs Street Railway and chairman of the Advisory Council American Electric Railway Association. The telegram from Mr. Shannahan reads, "No change in plans submitted for your Annual Statistical Number. We will adhere to those plans during the year." From A. G. Neal, vice-president and comptroller Washington Railway & Electric Company, comes the statement "We contemplate spending 100 per cent of each item listed on statement of capital and maintenance expenditures." The president of a large railway in the East says "Our company is carrying out a full program of

expenditures furnished you for Statistical Issue." Other typical replies are presented in an accompanying panel. From these answers it is clearly evident that the electric railways are planning to adhere to the previously reported budget of construction and maintenance expenditures totaling approximately $371,000,000.

A general summary of the plans of the industry for 1930, as presented in the Statistical Issue of this paper is repeated herewith.

Electric Railway New Equipment, Construction and Maintenance Budget for 1930

	New Plant and Equipment	Maintenance Materials	Maintenance Labor	Total
Way and structures ..	$88,400,000	$35,790,000	$51,360,000	$175,550,000
Cars	31,800,000	36,520,000	50,200,000	118,520,000
Buses	19,900,000	19,650,000	12,470,000	52,020,000
Power equipment....	8,950,000	10,520,000	5,660,000	25,130,000
Total	$149,050,000	$102,480,000	$119,690,000	$371,220,000

Only three companies replying to the JOURNAL inquiry are considering any curtailment of expenditures. One of these, located in an industrial territory on the Atlantic seaboard, believes it may be necessary to reduce expenditures 5 to 10 per cent if industrial conditions do not improve. Another is considering a curtailment of construction and maintenance expenditures ranging from 10 to 20 per cent. The third plans no change in its construction program but may adjust its maintenance budget to meet the decrease which has occurred in the number of revenue passengers carried.

To offset these possible reductions a number of other railways now plan to make larger expenditures in 1930 than were contemplated when figures were submitted for the Statistical Issue of the JOURNAL. Of particular interest is the statement of Lucius S. Storrs, executive chairman United Railways & Electric Company of Baltimore: "The credit of this company has been so far improved that a complete rehabilitation is in view and we have decided to materially increase our budget for new expenditures in the matter of cars and buses." In Detroit, General Manager Del Smith expects that the additional revenue derived from increased fares will permit the Department of Street Railways to add approximately 200 units of rolling stock to present equipment this year, as well as to make numerous other improvements not contemplated when budget figures were submitted. According to D. W. Harvey, general manager Toronto Transportation Commission, "Estimated new equipment and maintenance expenditures will be adhered to, with the exception that a greater amount will be expended for new buses." The Regina Municipal Railway has increased its way and structures budget 50 per cent. Other companies have indicated the possibility of making increases in improvement expenditures similar to those already mentioned.

Among the reports received, a number are particularly encouraging. Richard Meriweather, general manager Dallas Railway & Terminal Company states, "Our business shows slightly upward trend as compared with 1929." In the opinion of N. E. Drexler, division manager Virginia Public Service Company, the business outlook is good and is "already showing up better than last year." According to M. H. Frank, railway manager Wisconsin Power & Light Company, "We are proceeding as originally reported. Expect good year." From Cincinnati, J. B. Stewart, Jr., wires, "No change has been made in new equipment and maintenance expenditure budget. With opening up of outside construction season it is expected that conditions will more nearly approach normal and no cut in budget will be necessary."

Industrial conditions have not caused any change in the program of the Chicago, North Shore & Milwaukee Railroad, according to J. R. Blackhall, general manager. The company is planning to go through with all work as contemplated. He states that general conditions are beginning to show some improvement.

Increased traffic on the lines of the Montreal Tramways is reported by Col. J. E. Hutcheson, vice-president in charge of operation. He says that while curtailment has taken place in some lines of industry with a consequent increase in unemployment at this season, street railway riding has increased 3.66 per cent since the beginning of the year. D. W. Houston, general superintendent Municipal Railway of Regina, Saskatchewan, estimates that passenger revenue in 1930 will be about 10 per cent higher than in 1929.

Electric Railways Proceeding with

Full Budget Program

New equipment, construction and maintenance expenditures to be made during 1930 in accordance with original plans. Total remains at $371,000,000 despite uncertainty of present business situation

By

JOHN A. MILLER, Jr.

Managing Editor

Electric Railway Journal



A hundred cars of this type, using aluminum extensively, are being delivered to the Brooklyn & Queens Transit Corporation

Aluminum

Gaining in Favor

Experience with many vehicles built largely of aluminum alloys has proved the economic value of this metal, from the standpoint of both operation and maintenance

RADICAL changes in design during the past few years have resulted in the development of electric railway cars which are very different from those of a decade ago. General appearance has been greatly improved. Riding qualities have been bettered. Much attention has been given to interior design and appointments. Means have been found to reduce noise and to increase the smoothness of operation. Higher rates of acceleration and braking have been attained. And last, but not least, improvements in design have produced substantial economies in operation. An important element in this development has been the reduction in weight made possible by the extensive use of aluminum and its alloys.

Although the use of aluminum in car construction dates back to 1904, when the Interborough Rapid Transit Company and the Chicago City Railway used the metal for several parts, and to 1905, when the J. G. Brill Company used aluminum sheets for the headlining of cars for the Manila Electric Railroad & Lighting Corporation, experimentation on a large scale did not begin until 1923. In that year the Illinois Central Railroad built a number of cars for suburban electrified service, using aluminum extensively. From that period forward the use of aluminum alloys in car construction became more and more frequent. Electric railways, recognizing the advantages of reducing car weight, introduced the lighter metal in a number of sample cars and later in larger orders. In an accompanying table are listed a large number of cars that have been built of aluminum, and others that have used this metal to a considerable extent. Several electric railways have designated that certain parts shall in the future be built of aluminum.

In the construction of buses, too, aluminum has been used for a number of years. Several manufacturers have used aluminum panels for a long time, as well as miscellaneous aluminum castings. It is interesting to note, also, that aluminum has gained a strong foothold in Europe in the construction of both street cars and buses. As early as 1911, Zurich, Switzerland, used aluminum for car panels, roof members and fittings.

This extensive development of aluminum alloys has come about as a result of their many advantages. Outstanding among the points in their favor are strength, light weight, ability to absorb impact loads—making for greater safety, non-corrosive qualities and economical maintenance.

Aluminum alloys have been developed which have

about the same physical properties as mild structural steel, except that the modulus of elasticity is about 10,000,000 instead of 30,000,000 for steel and the coefficient of expansion is about twice that of steel. Through the process of heat treating it is possible to obtain aluminum alloy members comparable in strength with steel members of equal size. The Aluminum Company of America has developed alloys to be used for various purposes, five of which are particularly suitable for electric railway car construction. The strongest alloys are known as 17 ST and 25 ST and have physical properties similar to mild steel. Their tensile strength is from 55,000 to 63,000 lb. per sq.in., their yield point from 30,000 to 40,000 lb. per sq.in. and their elongation from 25 to 18 per cent. They are used for all strength members, including structural shapes, side girder sheets, letterboards, anti-climbers, coupler bars, etc. Another alloy used rather extensively is 51 ST, also heat treated, and having a tensile strength of from 45,000 to 50,000 lb. per sq.in., a yield point from 30,000 to 40,000 lb. per sq.in. and an elongation of 18 to 10 per cent. It is used for some interior finish, seat frames and trolley poles.

By

CLIFFORD A. FAUST

Assistant Editor

Electric Railway Journal

for Car Construction

The alloy used for interior sheets, bulkheads, moldings, trim, sign boxes, conduits, cable ducts and other parts which do not require the greater strength of the other alloys is 3 S, with a tensile strength of 20,000 to 25,000 lb. per sq.in., a yield point from 15,000 to 20,000 lb. per sq.in. and an elongation of 20 to 3 per cent. The fifth alloy used is 195 HT, an aluminum casting alloy, heat treated after casting to obtain the desired mechanical properties. These vary upon the heat treatment process administered, the tensile strength varying between 28,000 and 50,000 lb. per sq.in., the yield point between 13,000 and 29,000 lb. per sq.in., and the elongation between 12 and 0 per cent. It is used for trolley bases and harps, fender parts, drawbar anchorages and other similar parts requiring strength and ductility.



From the vintage of 1905—a car for Manila, using aluminum to withstand the ravages of "white ants"

Although as strong as steel, most aluminum structures weigh only about half as much. In parts where aluminum is used—the underframe, the body, the trucks, the motors and control and accessories—it has been found possible to obtain large reductions in weight. As will be seen in an accompanying table, savings in weight of 13,150 lb. have been made on some cars. In another table the structural members and equipment made of aluminum in the Cleveland Railway car are listed.

Among the more important results of light weight are less power consumption, satisfactory performance of smaller motors and other parts, higher acceleration, braking and running speed, less wear on the track structure, reduced wear of brakes and other parts, less strain on the framing, greater safety, better performance, reduction of unsprung weight of trucks and less noise.

Numerous tests have been made of power savings, resulting from lighter weight. All have shown very substantial reductions. One company reported savings varying from 15.7 per cent with a 23.1 per cent reduction in weight, to 46.2 per cent with a 33.3 per cent reduction in weight. By decreasing the weight of a car it is possible to use smaller motors with considerably less total rating, but which have a higher rating per pound of car. Similarly, many other parts, such as the controller and brake equipment, can be made smaller. Starting with higher acceleration, braking and running speed, made possible by lighter weight, a cycle is set up which includes fewer cars to maintain the same schedule, less power, fewer men, lower investment, etc.

The volume and cost of track work depends to a large extent upon the weight of the rolling stock operated. Light-weight cars can materially reduce the cost of track maintenance by subjecting the track to less wear. Because of the high accelerating and braking rates it is easier for an operator to handle a lighter vehicle. Consequently, these cars are usually handled much more efficiently and with greater safety. Less vibration and



The Illinois Central Railroad pioneered the use of strong aluminum alloys. The two-car train above, one of the first designed, appeared in 1923

Equipment in Which Aluminum Has Been Used, with Weight Data

Company and City	Equipment—Number and Type	Manufacturer	Date Equipment was Placed in Service	What Parts of the Vehicle are Aluminum
Interborough Rapid Transit Co. New York, N. Y.	300 subway motor cars and trailers	American Car & Foundry Co.	Oct. 27, 1904	Interior finish, all moldings for finish, hand rail, brackets and wiring molding. Wainscoting surface between seats, end interior panels, window panels and headlinings faced with aluminum
Chicago City Ry., Chicago, Ill.	200 semi-convertible double-truck cars	J. G. Brill Co.	1905	Air pipe, hand rails and fittings
Manila Electric Co., then Manila Electric Railroad & Lighting Corp., Manila, P. I.	15 full-convertible double-truck cars	J. G. Brill Co.	Aug., 1905	Sheet for headlining and ceilings
Illinois Central R. R., Chicago, Ill.	25 trailers 130 motor cars 85 trailers 10 motor cars—10 trailers	Pullman Car & Mfg. Co. Pullman Car & Mfg. Co. Standard Steel Car Co. Pullman Car & Mfg. Co.	1923 March, 1926 March, 1926 1928	Roof sheets, interior finish, doors, conduit, fittings, junction boxes and smaller parts
Pennsylvania R. R., Philadelphia, Pa.	8 suburban multiple-unit cars	Pennsylvania R. R.	1925	All of super structure—posts, carlins, sheets, bulkheads, doors, etc.
Chicago & North Western Ry., Chicago, Ill.	120 cars for suburban service	Standard Steel Car Co. Pullman Car & Mfg. Co. American Car & Foundry Co.	1927	All sheets above underframe
Cleveland Ry., Cleveland, Ohio	1 double-truck city car	Cleveland Ry.	Dec. 2, 1926	Body, underf ame and trucks
Pittsburgh Rys., Pittsburgh, Pa.	1 pair trucks	Pittsburgh Rys.	1926	All except wheels, axles, springs and working parts
Springfield Street Ry., Springfield, Mass.	1 double-truck city car	Wason Mfg. Co.	April 14,1927	Side members, letterboard, belt rail and body bolsters
Montreal Tramways, Montreal, Que., Canada	10 two-man city cars 40 of same type 30 of same type	Canadian Car & Foundry Co.	1927 1927 1928	Framing and exterior sheathing Exterior sheathing Exterior, sheathing
Chicago & Joliet Electric Ry., Joliet, Ill.	1 double-truck city car	Cummings Car & Coach Co.	Nov., 1927	Body and underframe
St. Louis Public Service Co., then United Railways of St. Louis, St. Louis, Mo.	1 double-truck city car	United Rys. of St. Louis	Dec., 1927	Body and underframe
Twin City Rapid Transit Co. Minneapolis, Minn.	25 city cars	Twin City Rapid Transit Co.	Dec., 1927	Sheets, posts and carlins. Use now standard except underframes
Cincinnati Street Ry., Cincinnati, Ohio	1 pair archbar trucks	Cincinnati Car Corp.	March, 1928	All except wheels, axles, springs and working parts
Utah Light & Traction Co. Salt Lake City, Utah.	11 Versare electric coaches 7 Versare electric coaches	Versare Corp. Cincinnati Car Corp.	Sept. 9, 1928 Dec. 4, 1929	All except two underframe members
Delaware Electric Power Co. Wilmington, Del.	10 double-truck city cars 10 of same type 12 of same type	J. G. Brill Co.	Dec. 4, 1928 1929 Not delivered	Sheeting, seats and miscellaneous parts
Calgary Municipal Ry. Calgary, Alta., Canada	3 one-man city cars 6 of same type	Canadian Car & Foundry Co.	1928 1929	Exterior sheathing
Pittsburgh Rys., Pittsburgh, Pa.	1 double-truck suburban car	Osgood-Bradley Car Co., Trucks by Timken-Detroit Axle Co.	June, 1929	Body and underframe. Trucks all except wheels, axles and springs
J. G. Brill Co. Philadelphia, Pa.	1 experimental trackless trolley	American Car Co.	June, 1929	Body and underframe
Dept. of Street Rys., Detroit, Mich.	1 double-truck city car	Dept. of Street Rys.	July, 1929	Castings, posts and miscellaneous parts
Northwestern Pacific R.R., San Francisco, Cal.	5 interurban motor cars 5 interurban trailers 5 motor cars of same type 5 trailers of same type	St. Louis Car Co.	Sept., 1929 Not delivered	Roofs, conduit, seats and interior finish
Louisville Ry., Louisville, Ky.	1 double-truck city car	Cincinnati Car Corp.	Sept., 1929	Body, underframe and trucks
United Traction Co., Albany, N. Y.	1 double-truck city car	Cincinnati Car Corp.	Sept., 1929	Body and underframe
Third Avenue Ry., New York, N. Y.	1 four-wheel double-end city car	J. G. Brill Co.	Sept., 1929	Body, underframe and parts of the truck
British Columbia Electric Ry. Vancouver, B. C., Canada	15 one-man, two-man cars	Canadian Car & Foundry Co.	Nov., 1929	Exterior sheathing
St. Louis Public Service Co., St. Louis, Mo	1 double-truck city car	St. Louis Public Service Co.	Dec., 1929	Body and underframe
Monongahela West Penn Public Service Co. Fairmont, W. Va.	3 double-truck cars	G. C. Kuhlman Car Co.	1929	Sheeting, air compressors and miscellaneous parts
Youngstown Municipal Ry. Youngstown, Ohio	13 city cars	G. C. Kuhlman Car Co.	Being delivered	Sheets and miscellaneous parts
Chicago & Joliet Electric Ry., Joliet, Ill.	1 four-wheel car	Cummings Car & Coach Co.	March, 1930	Body and underframe
Delaware, Lackawanna & Western R. R. Hoboken, N. J.	141 motor cars for suburban service	American Car & Foundry Co.	Not delivered	All sheets except outside side sheets
Brooklyn & Queens Transit Corp. Brooklyn, N. Y.	100 double-truck city cars	Osgood-Bradley Car Co., (50) J. G. Brill Co. (50)	Being delivered	Interior panels, headlining and miscellaneous parts
Board of Transportation, New York, N. Y.	300 subway cars	American Car & Foundry Co.	Not delivered	Seats, doors, door control, miscellaneous parts and all sheet except outside sheeting

Aluminum was used for car construction as early as 1904. In that year and the one following, three companies adopted the lighter metal for sizable orders. Experimentation on a large scale, however, began in 1923, when the Illinois Central incorporated strong alloys in the design of several suburban cars.

During the latter part of 1926 the Cleveland Railway completed the first all-aluminum street car. In 1927 cars were built in Springfield, Montreal, Joliet, St. Louis and Minneapolis.

and Other Pertinent Information

Weight of Aluminum Used in Lbs.	Total Weight of Vehicle in Lbs.	Weight Saved in Lbs.	Estimated Net Additional Cost of Aluminum per Pound of Weight Saved, in Cents	Weight per Seated Passenger in Lbs.	For Detailed Description Refer to the Issue of
.....	Live Load 88,000 motor car 66,000 trailer			1,620 motor car 1,180 trailer	Oct. 8, 1904 March 4, 1905
.....	52,000			1,182	April 8, 1905 Sept. 16, 1905
.....					April 29, 1905 Aug. 12, 1905
4,985 average	88,700 trailers 140,000 motor cars	8,958 average	22		Nov. 10, 1923 Feb. 7, 1925 Dec. 31, 1927
8,636	111,300	13,150	36		July 11, 1925
3,600	99,600	7,000	20	1,015	Jan. 8, 1927
6,647	30,300	12,901	20	618	Dec. 4, 1926 April 9, 1927
518 per truck	1,100 per truck	856 per truck	25.3		
735	23,450			521	March 26, 1927 May 14, 1927
2,275 650 650	33,400 35,900 34,700	3,700 1,200 1,200	22 22 22	759 817 789	Sept. 3, 1927 Dec. 10, 1927
10,000	23,722	13,500	20	474	Dec. 17, 1927
3,697	32,000	5,332	35.9	542	Dec. 24, 1927
1,372	27,670	2,618	17.3	553	Nov. 26, 1927 March 31, 1928
450	3,668	650	22.3		
.....	16,000			372	Sept. 8, 1928 Feb. 9, 1929
.....	36,640			833	Sept. 22, 1928 Dec. 15, 1928
700	37,800	1,330		713	Sept. 15, 1928 Jan. 12, 1929
3,325	25,200	7,863	19.4	600	July, 1929 Nov., 1929
1,595	14,500	2,282	24.1	483	Aug., 1929
.....	32,500	4,000		625	Aug., 1929 Nov., 1929
3,579 motor cars 3,226 trailers	110,000 79,000	6,650 6,049	17.6 average	1,122 motor cars 767 trailers	March 9, 1929
2,300	29,150	2,500	40	550	June, 1929
2,300	32,450	2,500	40	737	Nov., 1929 Feb., 1930
.....	27,000	3,000		530	Oct., 1929 Nov., 1929
650	39,000	1,330		780	Jan., 1930
4,084	36,180	7,350	19.7	584	Feb., 1930
.....	35,000			729	Jan., 1930
.....	28,000			622	Jan., 1930
.....					
.....	148,000			1,762	Aug., 1929
.....	34,000			630	Sept. 14, 1929
.....	85,000			1,417	Nov., 1929

The great number built in 1928 and 1929, listed in the above table with several now on order, indicates that aluminum as a metal for car construction is beyond the pioneering stage and well advanced in the period of general acceptance by the industry.

attendant noise result with the use of aluminum because of its physical nature.

Greater safety results from the ability of aluminum to absorb impact loads without distortion. In the event of a severe impact, when the yield point of the metal is exceeded there is a tendency for the structure to hold together. I-beams, webs of channels, built-up girders and gusset plates bend but do not tear, as most grades of structural steel will do under similar strains. The

Equipment and Structural Members of the Cleveland Railway Car, Made of Aluminum

Body
All side and end plates
Steps, front and center
Hand brake levers
Sash rail
Post angles
Door frame
Head lining strips
Conduit
Carlins
Letterboard
Junction box
Bulkhead

Underframe
Cross channels
Coupler bar attachment to underframe
Front platform stem
Body bolster
Gusset plates
Radial bar

Trucks
Side bars
Pedestal gibs and tie bars
Horizontal lever
Truck bolsters
Side bearing housings
Motor supports
Brake shoe holders
Top brake rods

Motors
Gear cases
Pinion and commutator end housings
Pinion and commutator end axle caps

Controller
Back frame

Accessory Parts
Bumper
Fare box
Seat pedestals and framework
Draw bar
Heater duct
Door shafts
Window locks
Conductor seat
Ventilators
Window guards
Brake cylinder parts
Front draw head
Fare box stand
Stanchions
Seat grab handles
Sign box
Sand box
Head light
Trolley base
Fender
Trolley catchers
Window screens
Coupler
Gong



During 1926, the Cleveland Railway built the first street car of aluminum, using this metal not only for the body and underframe, but also for the trucks

low modulus of elasticity is probably responsible for this characteristic.

Another distinct advantage of aluminum is its ability to withstand atmospheric corrosion. Because of this resistance there is little tendency for paint to peel off, as it does quite frequently on steel. Tests conducted on cars long in service show no signs of corrosion.

During the development of aluminum for street cars it became apparent that it was desirable to isolate the motor ground circuits to prevent leakage of current through joints of aluminum and steel. One instance was encountered where a divided ground circuit caused electrolytic corrosion of an aluminum joint fastened with steel rivets. This was entirely corrected by proper grounding.

From the standpoint of maintenance, aluminum alloys have numerous advantages. Chief among these is the ease with which the metal can be worked. A portable pyrometer for measuring heat intensity is necessary in a shop for the proper handling of aluminum alloys, and it



Early in 1927 the Springfield Street Railway introduced its light-weight experimental car, with side members, letterboard and other parts of aluminum

is desirable to have a pyrometer-controlled electric furnace, but no other equipment need be purchased. Punching, shearing, machining and riveting are all performed with the same tools that are used for steel. Bending cold must be watched and the particular qualities of the various grades and tempers of aluminum alloys known. Temperature control is essential for hot bending or forming, this process requiring a special technique.



The lighter metal was first used in Canada by the Montreal Tramways. A total of 80 cars with aluminum are now in service on this property

Aluminum alloys can be welded with an oxy-acetylene torch and at the present time an electric welding apparatus is being developed. Although aluminum parts for replacement are more expensive than steel ones, this cost can be largely offset by the high salvage value.

Perhaps the greatest deterrent to the more general adoption of aluminum alloys for car construction has been the higher cost of this material. The alloys used for car construction cost from 28 to 45 cents per pound or 9 to 15 cents per square foot, as compared with 3 to 6 cents for steel. However, the smaller weight of material required, the power savings possible, the lower first cost of motors and other parts and the lower maintenance cost of cars and track, largely offset the extra original cost. In terms of extra cost per pound of weight saved, 20 cents can be taken for an average. In the accompanying table listing cars using aluminum, the estimated additional costs of aluminum per pound of weight saved are shown. As will be noted, the figures vary from 17.3 cents to 40 cents. Since the net savings for those cars which were ordered in quantity vary from 15.3 cents to 22 cents, it is reasonable to assume the figure of 20 cents as representative. It has been further estimated that the cost of hauling dead weight is from 5 to 10 cents per pound per year for electric railway cars in city service and 3.5 cents on cars in heavy suburban service. Assuming the figure of 5 cents as the average cost, it appears that aluminum will pay for itself in a period of four years.

Another important factor bearing on the cost is the lower initial investment for motors and other parts which can be made smaller. It has also been pointed out that if lighter equipment were adopted generally it would permit the use of a lighter track structure, which would materially lower the capital investment in this part of the system. This would be true also for the generating and transmission system.

At the time the first cars were made of aluminum practically all of the parts were made individually, involving a heavy extra unit cost. In addition, the pioneer designers of aluminum cars expended large amounts in preparing their designs and in carrying out other experimental work. Naturally, the costs of the first vehicles were much in excess of the old standard cars. As the car manufacturers become more and more accustomed to the fabrication of this metal and get the proper machinery and training for using it, the costs will continue to go down. Moreover, when aluminum cars are built in quantity, it is likely that the total cost of a car will be no higher than for a standard steel car.

As has been pointed out, aluminum was used in the construction of cars as early as 1904. In that year and the year following three companies received cars using aluminum to some extent. They were the Chicago City Railway, the Interborough Rapid Transit Company and the Manila Electric Railroad & Lighting Corporation. The Chicago car used aluminum for the air pipe, hand rail, fittings and other miscellaneous parts, while the Interborough used



Another Canadian user of aluminum is the British Columbia Electric Railway. Only recently the company received 25 cars of the type shown

aluminum for the interior finish and miscellaneous castings in its cars. In the fifteen cars built by the J. G. Brill Company for the Manila company, aluminum sheet was used for the headlining. This metal was selected so that the cars would have a material which would withstand the ravages of the tropical insects without adding to the weight of the car.

In the early days of the local transportation industry wood was a satisfactory material for use in street car bodies. Later, however, came the need for a stronger material and metal began to replace wood. But aluminum was not ready. While it was effective in resisting the attack of insects in tropical countries, for the highly stressed portions of the structure it could not cope with steel. There were no strong alloys, and heat treating processes were unknown. In the next ten years, however, strong aluminum alloys were developed which have mechanical properties comparable with those of steel and which, at the same time, have the light weight of the parent metal.



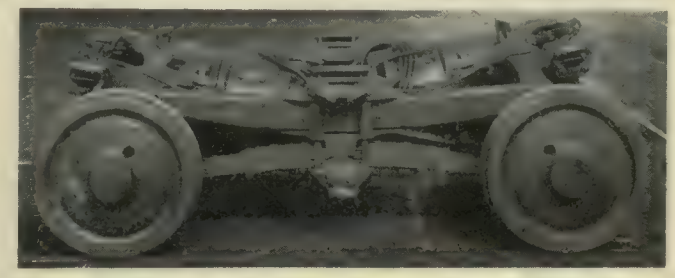
Five tons of aluminum were used in the Blackhall car of the Chicago & Joliet Electric Railway. The car seats 50 passengers but weighs only 23,722 lb.

The first attempt to reduce the weight of car equipment by means of strong alloys of aluminum was made by the Illinois Central Railroad, which constructed a number of cars for suburban service in 1923. These cars proved satisfactory, so 215 additional cars were built in 1925, with aluminum used for roof, seats, interior finish, doors, conduits, junction boxes, headlights and other miscellaneous parts. About this time the Pennsylvania Railroad went even further and constructed eight suburban cars for its service outside of Philadelphia with all aluminum superstructures. Practically everything above the underframe with the exception of a belt rail was constructed of aluminum. Shortly thereafter the Chicago & North Western Railway built 120 suburban cars having all aluminum sheets above the underframe. Both the Illinois Central and the Chicago & North Western have put additional cars in service since and have extended the use of aluminum somewhat over the original applications.

Among the first electric railways to use alloys were the Cleveland Railway, the Pittsburgh Railways, the Springfield Street Railway, the Chicago & Joliet Electric Railway, and the Montreal Tramways. In the car of the Cleveland Railway aluminum was employed not only in the body and underframe, but also in the trucks. Its total weight of 30,300 lb. represented a saving of 12,901 lb. over the standard car of the company. Because of the extensive application of the lighter metal and the great reduction in weight obtained, much interest was centered on this car.

The car designed by the Springfield Street Railway and built by the Wason Manufacturing Company used aluminum for the side members, letterboards, belt rails and body bolsters. Montreal introduced the first aluminum cars in Canada. In one order placed with the Canadian Car & Foundry Company in 1927 both the framing and exterior sheathing were of aluminum; in a second order all the sheathing was of this material. All metal in the car body and underframe of the Chicago & Joliet Electric Railway car was made of aluminum with the exception of the bolts, rivets and similar parts.

During 1927 a car for the United Railways of St. Louis and 25 for the Twin City Rapid Transit Company, all using aluminum extensively, appeared.



Timken-Detroit aluminum truck, weighing 5,621 lb., used under the Pittsburgh Railways all-aluminum car. The weight saving per truck was 929 lb.; for the entire car it was 7,863 lb.

During the next year a few more vehicles were produced, among them being ten city cars for the Delaware Electric Power Company, by Brill, three cars for the Calgary Municipal Railway, built by the Canadian



In this four-wheel car of the Third Avenue Railway, placed in service last September, aluminum was used for the body, underframe and parts of the new truck

Car & Foundry Company, a pair of Cincinnati Car Corporation trucks for the Cincinnati Street Railway, and eleven Versare electric coaches for the Utah Light & Traction Company. The latter order marked the first use of aluminum in the construction of trackless trolleys.

Spurred on by the developments in the previous years, the industry brought forth an even greater number of cars using aluminum in the year 1929. Among these were an experimental car for the Pittsburgh Railways, by Osgood-Bradley; a double-truck car for the Department of Street Railways, Detroit; ten interurban cars for the Northwestern Pacific Railroad, by the St. Louis Car Company; a sample car for the Louisville Railway, manufactured by the Cincinnati Car Corporation; the United Traction Company car, built by the Cincinnati Car Corporation; the four-wheel city car of the Third Avenue Railway, manufactured by the J. G. Brill Company; fifteen cars for the British Columbia Electric Railway, built by the Canadian Car & Foundry Company, and a sample car of the St. Louis Public Service Company.

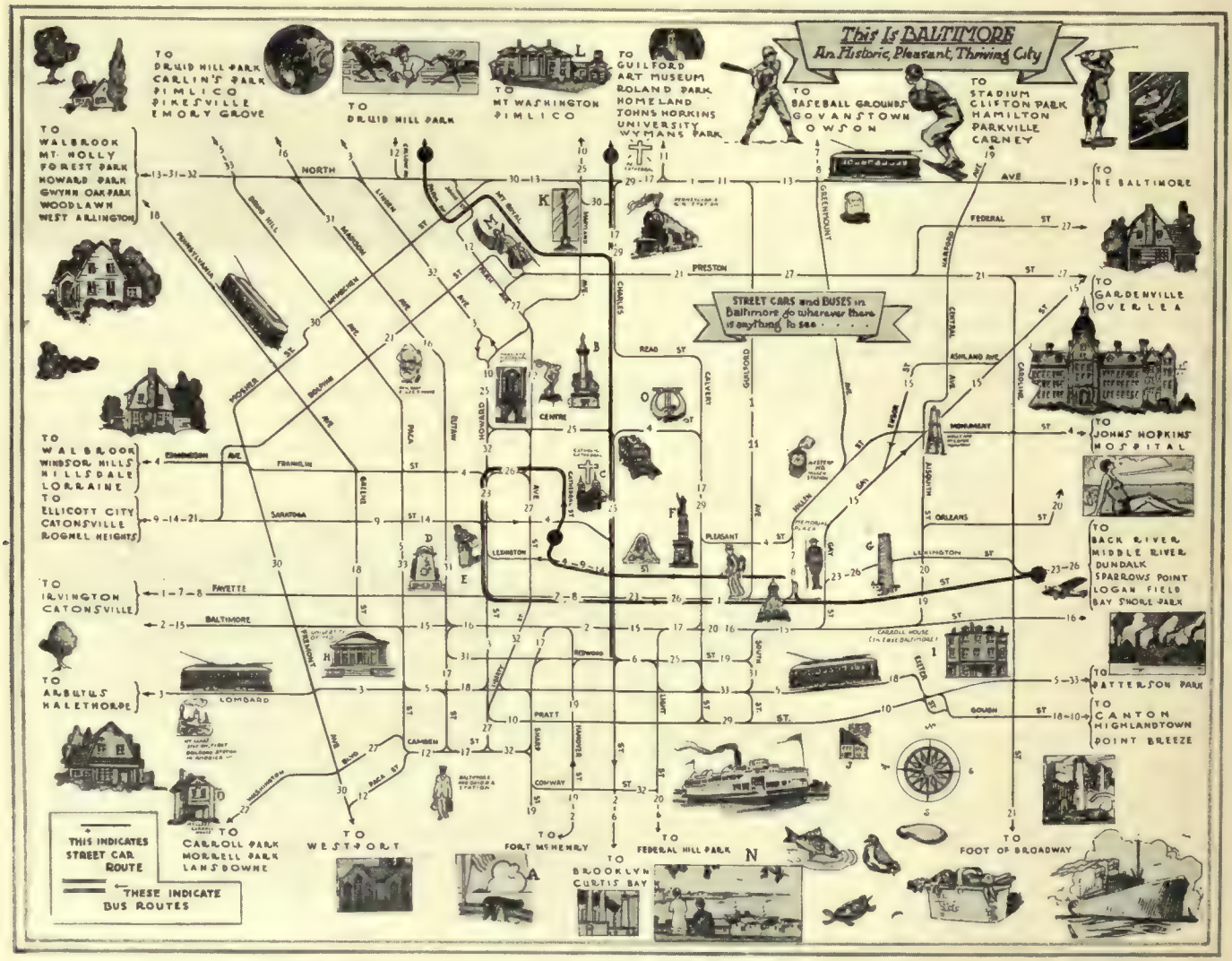
Among the more recent orders for equipment using aluminum are the four-wheel car of the Chicago & Joliet Electric Railway, designed by J. R. Blackhall; three double-truck cars of the Monongahela West Penn Public Service Company, by the G. C. Kuhlman Car Company; thirteen cars for the Youngstown Municipal Railway, of G. C. Kuhlman manufacture; 100 cars for the Brooklyn & Queens Transit Corporation, being built by Osgood-Bradley and Brill; 141 motor cars for electrified suburban service of the Delaware, Lackawanna & Western Railroad, and 300 subway cars for the city of New York, both these orders being filled by the American Car & Foundry Company.

Practically all of these cars have been described in detail in previous issues of ELECTRIC RAILWAY JOURNAL. In the accompanying table the dates of publication of these descriptive articles are shown, along with weight figures and other pertinent information.

With the rapid progress that has been made in the past seven years in the use of aluminum for car construction, and considering its many advantages, there is little doubt that this metal is destined to play an extremely important part in all future vehicle construction.

Railway Distributes Picture Map

AS PART of the celebration marking the 200th anniversary of the founding of the city of Baltimore, the United Railways & Electric Company printed and distributed a picture history map of the city illustrated in color in the medieval manner. This shows the company's car and bus routes as well as places of historic interest. The map folds up to pocket size. On the back are short sketches telling interesting facts about Baltimore's historic shrines. It has proved very popular with the public and demands were received by the company from individuals, department stores, hotels, etc., for extra copies.



Map tells how to reach historic spots in Baltimore by street car and bus

Prominent way engineers give opinions on basic principles of track construction and explain their practices under numerous specific local conditions



SINGLE LIFE *versus* RENEWABLE TRACK

AMONG the factors which determine the design of track laid in paved streets, the possibility of reconstruction at some future date under changed conditions imposed by new grades, street widening, or similar municipal requirements, is of prime importance. It might be thought that in the majority of large cities, alignments, width of streets and grades would have been permanently settled many years ago, but experience shows this is by no means the case. On account of changing conditions brought about by automotive developments within the past fifteen to thirty years, alterations continue to be made. Streets have been widened and straightened; paving construction has improved to meet the demands of greater motor vehicle loads and increased traffic. With a view to determining the effect which these changes have upon the design of electric railway track, the JOURNAL has obtained the opinions of a number of prominent way engineers.

Advocates of single-life track construction feel that had their predecessors 15 to 30 years ago designed tracks on the basis that some parts could be allowed to remain in the ground and be used again now in a rebuilt track, it would have been a mistake. They ask what way there is of knowing what conditions will exist 15 to 30 years hence. Frank B. Walker, chief engineer, Eastern Massachusetts Street Railway, states that in his sixteen years' experience on that New England property, in a section of the country which should be as settled as any other, there have been very few cases where a track has been reconstructed in the exact location and grade of the previous track. He further points out that the industry may be running buses instead of street cars in some places at the end of the normal life of present-day track. To spend any money on ties or foundations with the hope that when the rail is worn out, such material will be of benefit in reconstructing

a new track upon the old, Mr. Walker considers would be extremely ill-advised.

The relative advantages of single life and renewable designs depend also to a considerable extent on soil conditions. H. M. Steward, superintendent of maintenance, Boston Elevated Railway, stresses this point in his discussion of the subject. He states that under certain conditions of soil it is necessary to support the track structure on a concrete bed, similar to the invert of a subway. On this concrete bed the track structure is built, using a minimum amount of material for surfacing. With this type of construction it is assumed that the concrete bed below the track structure would not have to be disturbed and that a second track could be built thereon. With other conditions of soil steel ties or some form of mechanical tie may be imbedded in concrete of suitable strength and thickness, the top of the concrete slab being at the proper distance from the head of the rail to allow the pavement required to be installed. Some engineers using this form of track construction are of the opinion that when the rails wear out it is possible to remove the old rail and install new ones, or by using a shallower rail, by raising the grade of the track, or by a combination of both, to build a new track structure on top of the old concrete foundation.



Monolithic concrete track recently built by the Boston Elevated Railway

Mr. Steward further points out that where the soil conditions are more favorable, it is often not necessary to provide a concrete bed for the track structure, or to imbed the ties and a portion of the rail in concrete. Instead, wooden ties and a sufficient quantity of crushed stone ballast can be used to provide a satisfactory track. With this type of construction a concrete base to support the paving, approximately 6 in. in thickness, may be provided, upon which any type of pavement may be laid. When it becomes necessary to rebuild this type of track the ballast, at least, will be available for further use if it is properly cleaned, and it is also probable that the ties, if they have been properly treated, will be in sufficiently good condition to warrant their use for a second track.

Despite these views on the possibility of a renewable type track construction, Mr. Steward believes that a street railway has no permanent right in a public street, but instead, locates and builds its track only "at its peril." Street changes, necessitating complete relocation of a track area, or underground structures which are constantly being installed under or across the track, mean complete or partial reconstruction of the track and substructure. No matter how carefully a track may be constructed, it will be damaged to a very considerable extent if the paving between the rails or alongside the rails is not carefully installed to prevent water from entering.

With the possibility that all or some of these factors will enter into the problem, Mr. Steward does not believe it advisable to expend too large an amount of money with an expectation of building a permanent structure which will not be disturbed, in order that certain parts may be renewed without disturbing the balance.

In San Francisco, the adoption of single-life track construction has largely been governed by local soil conditions. B. P. Legaré, engineer, maintenance of way and construction, Market Street Railway, has found it impracticable to use a type of renewable track structure with the idea of saving a part of it when reconstruction becomes necessary. In that city there are several



In 1907, track on Market Street in San Francisco had to be raised 4 ft. to bring it back to original grade

different kinds of soil. A great deal of the downtown, heavy traffic district is made up entirely of fill, over an area which was originally either water or mud flats. In these localities it is impossible to keep the grade of the street at any fixed elevation. Obviously, under this condition it would not be practical to construct a track with the expectation of only renewing the rail and utilizing the foundation at some future date. On the Main Street-Market Street line, Mr. Legaré has reconstructed the track twice in the last 24 years. In each case the street had sunk below the official grade and had to be brought back to that grade at the time of laying the new track. The first time it was raised approximately 4 ft. and the second time, at the same place, 3 ft.

In other localities of the city, where the soil does not settle and stays at practically a uniform grade, the Market Street Railway has been forced to renew track areas in conformity with changes in street structure made by the municipality. In order to meet the change in traffic conditions and the demands of modern motor vehicles, the city has tended to replace old pavement with more modern structures, which in many cases change the crown of the road. The city of San Francisco is replacing a large number of granite block pavements with asphalt, the latter requiring a much flatter crown than the block construction. This, of course, necessitates a change in the elevation of the track structure.

If the electric railway track were built on a permanent foundation, it would be awkward to find a rail that would fit the changed conditions, and such construction would be very expensive to tear out. Experience on the Pacific Coast has proved that, in a paved street, the redwood tie will last as long as the rail and should be renewed when the rail is renewed.

Further experiences in San Francisco are given by M. M. O'Shaughnessy, chief engineer, Municipal Railway of San Francisco. Although he has never used a type of construction in which only certain parts are renewable, his observation of such construction has always been that by the time the rails needed replacing, new ideas of construction or unsatisfactory results necessitated entirely removing the parts which were supposed to be permanent. This often resulted in excessive costs and sometimes abnormal delays. He feels that nothing has yet been brought forward to equal the wood tie construction on a resilient base. Standard construction of the Municipal Railway consists of wood ties laid on a substantial hard rolled sub-ballast. Experience has proved that in using California split redwood ties, the life of the wood is equal to that of the rail on all of the major routes. Complete reconstruction of such track is done at minimum expense and with the least disturbance to service.

M. M. Johnston, division engineer, the Connecticut Company, New Haven, Conn., in discussing his preference for single-life construction, states that the most economical method of designing and building a track structure should insure full serviceable life of the particular rail section to be used on each job. In other words, the rail should be the governing factor in track design. He believes that as there is usually very little material of value that can be salvaged or re-used after this period, it is more economical to rebuild the entire structure after the rail is worn out in service. He further states that with the present improved methods of welding the rail, it seems only reasonable to assume that the joint is no longer one of the weakest points in the track structure and that its life, with reasonable maintenance in the way of grinding out any depression that may develop on the rail head, will equal that of the rail.

In discussing the ties to be used, Mr. Johnston believes that either wood or substitute ties will function properly during the life of the rail, provided proper care is taken in their selection. With the wood tie properly spaced to distribute the loads on the ballast, tie plates used to prevent cutting the rail and the ties thoroughly protected by a good concrete foundation, there seems to



Again in 1923, complete reconstruction of track structure had to be made on Market Street, San Francisco, when street was brought back to official grade

be little fear that the ties will fail before the rail life is gone. In his opinion excessive rail movement, which is so destructive to the ties and pavement, usually develops from one or more of the following causes: Improper spacing of ties, poor tamping or spiking, and the failure to use tie plates when necessary to distribute the load and prevent rail cutting. If this movement is prevented by good designing and careful inspection, Mr. Johnston believes there should be very little trouble, if any, from tie failures.

Track structures built for single life as a unit, but with a maximum amount of salvage value when rail renewal becomes necessary, are considered by Howard H. George, superintendent of way department, Cleveland Railway, Cleveland, Ohio, as the ideal construction. Mr. George's experience has taught him that the design of a track structure should be governed by the following factors: The probable number of years the track will be required to be maintained in the location at which it is to be constructed; the volume of traffic it will be required to carry during that time; and the probability that, within its normal useful life, it will have to be disturbed for reasons beyond the control of the railway, as, for instance, changes in grade or alignment of the street.



Pressure-treated creosoted wood ties are used in Cleveland

These factors will all have an important bearing upon the type of track which should be built, but even when they are determined within a reasonable degree of accuracy, sound economics should control the final selection. Mr. George believes this goes much farther than first cost. The following conditions should be met: The design should provide reasonable assurance of the maximum useful life for the structure as a unit; it should be such as to insure the minimum amount of expense for maintenance during its useful life; it should be such as to permit the maximum amount of salvage when rail renewal becomes necessary, and this requirement takes into consideration the possibility of renewing with a different rail section than that used originally; it should be such as to make it entirely practicable to make any necessary repairs with a minimum interference with car operations, and finally, it should be such as to interfere for the shortest possible time, and to the least possible extent, with the public use of the thoroughfare on which it is constructed, either for its original construction, ordinary repairs, or for major renewals.

It has been Mr. George's experience over a period of 25 years that these requirements are best met by a type of construction which will permit the structure, from the ties down, to wear out at least two sets of rails. He prefers pressure-treated, creosoted wood ties, and believes that if proper and well-known rules and precautions are observed in constructing such track it will give excellent service during the normal life of the first rail, and when it becomes necessary to renew this rail, it can be accomplished with minimum expense and with the least interference to the public use of the street as well as car operations. Mr. George adds "What we must aim for is to reduce the cost per year of useful life of every unit in the track to the smallest figure practicable. But in any case, all the factors must be considered and not just a few."

That the question of single life versus renewable track construction hinges on the proper treatment of the paving problem is the opinion of W. R. Dunham, Jr., Department of Street Railways, Detroit, Mich. He believes that to determine the proper track construction the pavement must be considered as a part of that structure and that track should be designed so as best to fit in with it. A break-down in pavement even when laid around track built in the best possible way as a track structure, will inevitably cause high maintenance costs, together with the destruction of the track. The breakdown may be entirely due to the track construction. A pavement must be rigid if it is to withstand traffic; a flexible track cannot be built in a rigid pavement without destroying the pavement. To build a track in these days with the basic idea in mind of renewing a part of it 40, 30, or even 20 years hence in the face of ever-changing conditions in the industry, hardly seems warranted. Mr. Dunham's experience indicates the need for more thought for permanency and less for renewability.

It has been the standard practice of the Birmingham Electric Company, Birmingham, Ala., to construct track on creosoted ties with well-tamped ballast. On top of this is placed a 6-in. slab of concrete to hold the brick paving. According to A. Taurman, superintendent of equipment, way and structures, this type of construction has worked out very satisfactorily for the following reasons: Creosoted ties and blast-furnace slag are easily secured at reasonable prices; this type of track construction can be done under traffic; the territory along many of the streets in Birmingham is not very well developed and the gas, water, and sewer lines in many places have not been installed. This type of track construction readily lends itself to repairs when these lines are installed as the city develops.

The only criticism Mr. Taurman finds with this type of track construction is that when the rail is worn out the concrete slab may have to be removed, but he feels there is no reason why the ties and ballast should not be used. The type of rail he is using is 101-lb. T, with thermit-welded joints, which he estimates under traffic conditions will last from 20 to 25 years. In the downtown section, where traffic is heavy, the Birmingham Electric Company installs 122-lb. girder rail, and Mr. Taurman is of the opinion that track constructed where both vehicular and electric car traffic is heavy should have a permanent base if possible, so that when the rails are worn out they may be renewed with as little interruption to traffic as possible. He has recently found it necessary to renew rails in the downtown section where the track was constructed on this basis, and found that

the interruptions to traffic were very slight, compared with what they would have been if the entire foundation had had to be removed.

J. H. Haylow, chief engineer, Memphis Street Railway, Memphis, Tenn., states that experience in this city proved that a track foundation consisting of stone ballast, well drained, and creosoted pine ties covered with concrete will endure for at least 40 years. Also, that 7-in. standard A.E.R.E.A. rail, judging from his experience in other sections, will endure for 20 years. Why not, therefore, install another rail on the same foundation? By so doing Mr. Haylow believes that money can be saved, that the accident liability of the company can be reduced and that much inconvenience can be saved the company as well as the public. He believes that for a long period of time and the probability of change in grade of the track is slight, Mr. Roundey believes that a carefully constructed track area with a permanent foundation is economical and that rail renewals can be made without disturbance of the sub-structure.

C. A. Smith, superintendent roadway department, Georgia Power Company, Atlanta, Ga., believes that the question of single life or renewable type track construction depends principally on what is likely to be done in the street in the repaving or changing in grade at some future time. He states that it would not pay to go to any additional cost to make provision for the renewal of the rail on the old foundation if there was a likelihood that the grade of the street would be changed or that the type of pavement would be such that the original



Snaking-in a long section of thermit-welded rail in Birmingham, Ala.

these considerations constitute convincing evidence that it is not only good engineering but good business to construct a track foundation that will not be materially interfered with when the time comes to renew the rail. The standard type of track construction in Memphis is shown in an accompanying illustration.

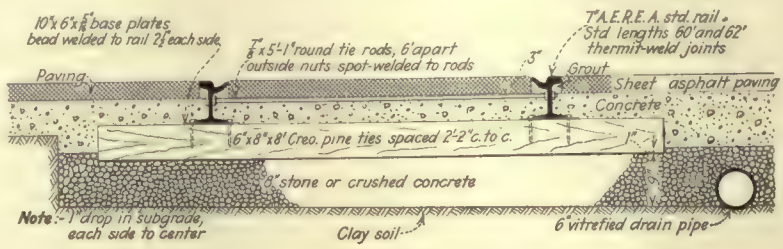
In discussing his preference for renewable type track construction E. P. Roundey, engineer way and structures, New York State Railways, Utica, N. Y., takes into consideration the factors which affect the first cost, maintenance and replacement. He considers the three types of track structure most commonly used, namely, "steel tie and concrete ballast, wood tie and concrete ballast, and wood tie and stone or gravel ballast." The concrete-ballasted type, with either creosoted wood or steel ties, is the type which ordinarily will require renewal of the rail only. The wood tie and stone or gravel ballast type usually requires renewal of the ties as well as the rail, unless the ties are creosoted and protected from mechanical wear by tie plates.

Mr. Roundey's experience has shown that in some cases many of the ties in concrete-ballasted construction become loose by the time the rail is worn out so that much of the ballast has to be excavated and replaced. This costs about as much as it does to replace wood ties on stone ballast. However, when conditions of the subgrade are proper, the width of street definitely settled foundation could not be used. In some instances, however, such foundations can be provided at very little additional expense, and when the time comes for the rail to be renewed this can be done on the old foundation, if properly constructed, at a saving of a great deal of expense over the reconstruction of the whole track.

Many renewals of this sort have been made in Atlanta. For example, last year it was necessary to renew the rails and special work at Peachtree Street, near Currier Street. This special work curve of 9-in. guard section was built in 1915, the foundation being creosoted pine ties on grouted ballast. The estimated cost of tearing up the whole paving area, track and foundation and replacing them was approximately $12,000. It was anticipated, however, that the creosoted ties and grouted ballast would be in good condition and, therefore, the pavement was opened up for approximately 1 ft. on each side of each rail only; tierods were burned off; the old rail was taken out and a new 9-in. rail of exactly the same alignment laid on the old ties. The ties and foundation were found to be in good condition. Beveled tie plates were installed on each tie. In 1915, it was not the practice to use steel tie plates as it is now, and without these plates Mr. Smith has found that the life of a creosoted tie is determined by mechanical wear rather than by decay. The old tierods were burned off about 6 in. from the rail and new tierod

terminals welded to the old rods. This eliminated the necessity of tearing up the pavement to install new tie-rods. The total cost of the job, carried on as outlined above, was $5,920, only about 50 per cent of what it would have cost to reconstruct the whole track, including the foundation and pavement. A sketch showing the tierod terminal is shown with this article.

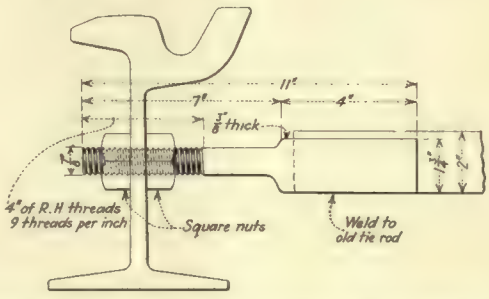
Likewise, Mr. Smith's department has had many instances where it has been able to renew special work, such as double-track branch-offs, using the same design of work and same depth of rail, laying the new work on the old road bed, this road bed consisting of creosoted pine ties and grouted ballast. Whenever this can be done, it saves approximately 50 per cent of the total cost as compared with what the cost would be if the whole roadbed had to be reconstructed. The present practice in Atlanta on straight track is to use 80-lb. A. S. C. E. rail, beam construction with ties spaced 5 ft. on center, concrete pavement. The reasons for the adoption of this design are its low cost of construction and its permanence. Renewal of the rail without renewing the foundation in the future was not a primary factor. This, however, Mr. Smith thinks can be done.



Standard track construction used by Memphis Street Railway



Treated wood tie and stone balast sub-structure is used to serve through the life of two rails in Memphis



Welding new terminals to old tierods has effectively cut the cost of track renewal in Atlanta

The question as to whether it is more economical to build single-life or renewable track is one that requires careful consideration of the specific conditions to be met. This is the expression of H. F. Merker, formerly chief engineer, Brooklyn City Railways, Brooklyn, N. Y. Assuming that economy is the basis on which the question is to be considered, there should be some assumption as to what can reasonably be considered the life of a piece of track. Many tracks have been declared worn out, yet have carried cars for a considerable number of years thereafter by careful maintenance. The life of track has been variously taken at as low as 10 years and as high as 25, and furthermore there are tracks still in service as old as 30 years or more. Somewhere within this range, however, would lie the life that would have to be considered. In selecting the type of track for any specific condition Mr. Merker further considers the kind of paving to be used, and what assurance there is that when the track is later to be reconstructed the same type and design will be used. Again, what section of rail is to be used, and can it be determined what section will be used in future reconstruction? What will be the grade of the reconstructed track? What is the soil condition and does it require a rigid foundation to carry the track?

This latter question of soil conditions Mr. Merker considers an important one. If a rigid foundation is needed on account of local soil conditions (and this is frequently the case) then the foregoing questions shrink in importance, and it might be just as well to provide a renewable type of construction, as the loss would not be great if the conditions, by chance or otherwise, were unfavorable to renewal. If, however, there is doubt as to the kind of paving that would be used in reconstruction, or if there is a likelihood that another section of rail will be used, or if a change of grade is probable, and particularly if the local soil condition is such as to permit a much cheaper type of construction for base or foundation, then it would not seem good business to invest a large sum of money in a construction that is not really needed.

Mr. Merker states that there have been many localities where a track could safely be built with nothing under the ties but the natural soil, assuming that the ties used were standard wood ties, with the usual spacing. There would be needed, of course, a base for the paving, but when time came for a renewal, the entire structure could economically be scrapped and entirely renewed, allowing at the same time a change of type or section of rail, a different sort of paving, and at the same time any change of grade that might be required. Many soils, however, lack the supporting qualities necessary for this type of cheaper track construction. In such a case it would be far better to add the extra cost in building a track that would distribute the load, keep out the water and permit the renewal of the worn parts, which would be the rail, leaving the sub-structure to do additional service for another life. Mr. Merker concludes that in his opinion there is no one type or design of track that would meet all conditions, that each case or each locality must be carefully considered individually and the track structure designed accordingly.



At each scheduled repair, the mechanic in charge of engine inspection is responsible for the draining, cleaning and refilling of the crank case

Sheer gat grease guns are used to lubricate steering and other chassis mechanisms



Economies Effected in Bus Lubrication

Individual responsibility of the mechanic for the proper lubrication of parts he inspects at scheduled repair periods and reclamation of oil are important features of bus maintenance practice of P.R.T.

BY GIVING special attention to the subject of bus lubrication, the Philadelphia Rural Transit Company, subsidiary of the Philadelphia Rapid Transit Company, has effected substantial savings. Maintenance practices carried on in its shops are regulated by the actual amount of service performed by each vehicle. All buses are gasoline-electric type Yellow Coaches, equipped with kilowatt-hour meters. Inspections, repairs and lubrication are scheduled according to these meter readings.

When the meter shows 3,500 kw.-hr. service, which corresponds to approximately 2,500 miles, the bus is held out for a day and subjected to what is known as a "scheduled repair," including thorough inspection, minor repairs, and complete lubrication. Each mechanic assigned to work on a part of the vehicle is held responsible for the proper functioning of that part. One man tests and greases all steering mechanism, another the rear end, and a third all electrical equipment. The mechanic assigned to brake inspection packs all the wheel bearings and the man in charge of engine repairs drains the oil, cleans the lower half of the crank-case and refills the case with the required amount of clean oil.

Routine oil replenishment is made each time the bus enters the garage, regardless of whether it has operated one trip or a full run. On long runs the oil and gasoline are checked on the street at scheduled periods of about every eight hours, and replenishment for buses in the north end of the city are made at the company's filling station at Broad Street and City Line. On a number of vehicles which operate on outlying routes, special gaso-





Upper view—Portable pumps of different sizes and construction are used for different lubricants

In center — A centrally located fireproof building houses the oil and waste reclaiming equipment exclusively

line tanks of 80-gal. capacity, and 16-qt. oil cases have been installed, so that oil and gas will not have to be added during a full day's operation.

Two additional lubrications are based on a kilowatt-hour meter reading. At between 8,000 and 9,000 kw.-hr., all brakes are relined, at which time axles are dissassembled and packed with grease and at 105,000 kw.-hr. the buses are routed to the general shop for complete overhaul.

Five grades of grease have been adopted as standard for heavier lubrication. Universal grade is used on the steering mechanism, in the universal, front and rear wheel bearings, fans and for all other chassis lubrication. A grade 600-W is used in the rears only, and a special ball-bearing lubricant, grade A, is used on all power generators and motors. A special water-pump grease is used on the water pump only. Medium grade oil is used for the lubrication of starting motors, lighting generators and distributors.

One oil, known as M.M. summer heavy, is standard throughout the property for engine lubrication. It is an all-year-round oil of such quality that the company has found it suitable for repeated reclamation. A mixture of new and reclaimed oil in a ratio of 60-40 parts, respectively, has proved satisfactory and is supplied to the engine at scheduled repairs and at daily replacements.

A process whereby the oil drained from the crankcases is saved, reclaimed and mixed with new oil for use again is a prime economy factor in P.R.T.'s maintenance practices. When the mechanic at the garage, who is in charge of engine repair, drains the oil from the crankcase of the bus he stores it in steel drums for shipment to the reclaiming plant. When a truckload of drums has accumulated they are transported to a centrally located building which is used exclusively for the reclaiming of this oil and the reclaiming of waste. Here the oil is transferred to a series of 550-gal. storage tanks.



Power generators and motors are lubricated with a special ball-bearing grease

The equipment used in the reclaiming process consists of a mixing and treating tank, a centrifugal oil purifier for removing carbon, dirt and other inorganic matter, and a distilling apparatus for removing the water and reagent used and for restoring the viscosity. The same equipment is used for the reclaiming of oil drained from the crankcases of the taxicabs owned by the Philadelphia Rapid Transit Company as well as buses maintained for its other subsidiaries. Approximately 200 gal. of oil is put through the process on each day that the plant is in operation, three days each week being devoted to bus oils and two to those from taxicabs. Thus approximately 1,000 gal. of oil is reclaimed each week.

The process is begun by pumping the oil from the storage tanks into the mixing chamber where water and a reagent are added, the whole mixture then being heated to about 200 deg. F. and well agitated. The mixture is then pumped through a centrifuge at the rate of 80 to 100 gal. per hour, where the greater part of the foreign matter is removed. The clean oil is sent by gravity to the rectifier where the diluent is removed by a distillation process.

The oil is circulated through two electric heater elements to the top of the rectifier where it filters down over tile and again circulates until it has reached a temperature of 130 deg. C. Dry steam at low temperature is forced into the rectifier in an opposite direction to the oil flow. The gasoline and kerosene contents are vaporized and carried off by the steam to the top of the rectifier and into the condenser, to be collected and used around the plant for general cleaning purposes.

With each 10-deg. increase in oil temperature the steam admission valve is opened wider. By the time the oil has reached 195 deg. C. the valve is in full open position. At this temperature practically no more foreign elements are present and the process is completed. About 3½ hours of still operation are necessary to bring the oil back to its original viscosity. It is then passed again through the centrifuge to remove any final traces of dirt and then put into drums for shipment back to the various garages.

90 Per Cent of Oil Reclaimed

A very careful check is kept on the oil thus reclaimed. Each day a sample of the reclaimed oil is sent to the company chemist for inspection and comparison with the new oil as originally purchased. Approximately 90 per cent of the oil put through this process is reclaimed for re-use, the remaining 10 per cent being lost in the form of carbon and dirt.

The time required for the entire reclaiming process covers approximately ten hours and the process is handled by one man. The cost is slightly under 10 cents per gal., which includes labor and material, depreciation and maintenance, power and trucking.

Proper Lubrication Prolongs Life of Control Equipment

By G. L. Moses
Renewal Parts Engineer
Westinghouse Electric & Manufacturing Company

FROM an operating standpoint, it is much worse to "over-lubricate" control equipment than to neglect its lubrication. The important points to lubricate on electric railway control apparatus are the contact fingers and piston leathers, but such lubrication should be done sparingly. Frequent operation of drum controllers and other control apparatus, such as reversers, interlocks and sequence switches, in which contact surfaces move under fingers, may cause considerable wear to both finger and contact surface. This wear can be materially reduced by proper oiling. This should not be done, however, unless the controller can be kept clean and free from abrasive dust. The collection of such dust in the lubricant will increase the cutting, thus defeating the purpose.

Lubrication Schedule for Control Equipment

Part	Lubricant	Period, Miles
Main circuit controller fingers and contac's	Light oil	500
Master controller and interlock fingers and contacts	Light oil	2,000 to 3,000
Controller bearings	Light oil	1,000 to 2,000
Air cylinders (and piston leathers)	Special oil	10,000

The proper lubricant for fingers and contact surfaces is a light machine oil. Vaseline should not be used, particularly in cold climates, as it is stiff, and, if not properly applied, may lift the finger off the contact causing failures in service.

The contacts and fingers should be clean and dry when the lubricant is applied. Kerosene may be used in cleaning them if necessary. The lubricating oil should be applied to fingers and contacts with a cloth or small brush. The apparatus should then be operated so that the fingers pass over the contact surfaces several times. Afterwards the surplus should be removed from finger tips and contact surfaces with a clean cloth.

Contacts where arcing is severe, such as main circuit drum controllers, should be lubricated frequently. This can be done at light inspection or once a week.

Caution Against Excessive Lubrication

A general use of oil in piston leathers, except during overhauls, is not recommended as the treatment of the leather provides sufficient lubrication for ordinary service. The excessive use of oil on piston leathers should be avoided as more damage may be caused from excessive oil than from too little. If severe service necessitates extra lubrication of piston leathers, the oil recommended by the manufacturer of the equipment should be used in small quantities as follows:

1. Inject through the hole in the top of the cylinder casting not more than ⅛ oz. (1 teaspoonful) every 10,000 miles.

2. Oil may be used more frequently should pistons shows signs of becoming gummy, but only in sufficient quantities as a solvent to obtain free operation until piston leathers can be cleaned or replaced.

This oil should be used during heavy overhaul when the pistons are removed from the cylinders. Pistons and cylinders should be coated well with this oil after being thoroughly cleaned. Approximately 1/16 oz. is required for each cylinder and piston.

Bearings of all rotating members, drums, pawls, rollers, etc., of control apparatus should have a light oil applied at every other regular light inspection period.

The accompanying tabulation indicates the parts requiring lubrication, the proper oils and the frequency with which they should be applied.





Shop Efficiency

Overhaul of equipment has been put on mass production basis at New Orleans. Quality of work has been improved by specialization. Availability of extra parts at operating stations encourages preventive maintenance

RECOGNIZING that good maintenance is an important factor in giving the type of transportation service demanded by the public, the management of the New Orleans Public Service, Inc., shortly after the reorganization of this property in 1920 placed the operation of the equipment department on an entirely new basis. The company undertook to improve the rolling stock in every possible way and to stimulate interest among the personnel employed in its maintenance. Change after change was made in the course of the next few years, each one contributing in some measure to lowering the cost and improving the quality of work. In July of 1924 the company instituted the unit replacement system, accompanied by a rigid program of inspection. Further modifications in the plan were made as they appeared warranted, but the general principles have been adhered to consistently.

The maintenance achievements of the New Orleans Public Service, Inc., during the past few years are well known to most equipment men. In November, 1920, the maintenance cost per car-mile of the railway was $0.057. For the year 1924 this figure was $0.02114, representing a reduction of $0.03586, or 62.9 per cent. For the year 1925 the figure was $0.01979; for 1927 it was $0.01958, and for 1928 it was $0.01919.

The results of preventive maintenance methods and a high standard of workmanship, however, are even more strikingly reflected in the record of pull-ins. For the year 1929 the company led the 27 members of the Electric Railway Association of Equipment Men, Southern Properties, with the remarkable record of 303,985 miles per pull-in chargeable to equipment, exceeding the second company on the list by 160,946 miles, the third by 161,223 miles and the fourth by 258,981 miles. In total pull-ins New Orleans was second among the 27 companies with the figure of 62,835 miles per pull-in. In this connection, it should be remembered that strike conditions in the city during 1929 were responsible for a number of cars being taken out of service. Over the period of the past nine years the company has made a remarkable record in increasing its average car mileage per pull-in for any cause. From 1921 to 1929, inclusive, the annual figures were 2,803, 10,168, 23,791, 37,080, 64,918, 100,838, 152,632, 121,001 and 62,835. In the matter of pull-ins for mechanical defects, the company has made the following record: 1921, 5,797; 1922, 1,247; 1923, 304; 1924, 118; 1925, 79; 1926, 56; and 1927, 35.

While increasing its standard of maintenance the company made a large decrease in the number of men employed. Figures for the Magazine and Carrollton shops show that 234 men were employed in 1921, 223 in 1922, 219 in 1923, 203 in 1924, 148 in 1925, 132 in 1926, 126 in 1927 and 112 in 1928. It will be noted that the last figure is less than half of that for 1921. By centralizing all overhaul work the company also was able to reduce the number of men employed at the outlying stations. Number of men employed at the stations, with the exception of the repair foremen and clerks, totaled 220 in 1921, 213 in 1922, 208 in 1923, 187 in 1924, 161 in 1925, 148 in 1926, 146 in 1927 and 135 in 1928. Another indication of the improvement in quality of work is shown by the steady reduction in the number of armatures requiring rewinding. Rewinds totaled 201 in 1923, 148 in 1924, 55 in 1925, 36 in 1926 and 30 in 1927.

Undoubtedly, the unit replacement system has contributed to a notable extent in these achievements. Among the important factors which have been instrumental in raising standards and lowering costs are the organization of the department of rolling stock and shops, each man in the set-up having his duties definitely outlined; supervision of all shop work by trained engineers; educational facilities for the foremen and department heads; regular monthly meetings of department heads, at which methods and costs are discussed; creation of competi-







Improved *by Unit Replacement System*

tion among the stations through comparison of records; careful selection of employees; an excellent morale, reflected all through the organization; elimination of all manufacturing in the shops; active participation in the Electric Railway Association of Equipment Men, Southern Properties, through attending meetings, exchanging ideas and comparing costs and records; installation of all necessary modern machinery and equipment; a rigid inspection system; use of the most modern shop methods; thoroughness in all repairs, and complete overhaul of all equipment. No single one of these factors is responsible for what is being accomplished, but all are important elements in the functioning of the rolling stock and shops department.

Periodic inspection in New Orleans is conducted in the five outlying stations on a 1,000 car-mile basis. Instructions are issued daily in written form to the station foremen, advising them which cars are due for examination. All pneumatic, electrical and mechanical equipment on the cars, from the trolley wheel down to the brake shoes, is thoroughly inspected, as well as the car body itself. If this inspection discloses that some repair work must be done, the work may or may not be done in the station, depending on the nature of the repairs. For example, no motor repairs are performed in the station; the car must be sent to the equipment overhauling department. Line breakers or circuit breakers may have their contact tips renewed in the station, but all other work must be likewise performed at the equipment overhauling department. Hence, each station is supplied with several line breakers, circuit breakers, lightning arresters, resistors, motormen's air brake valves, air compressors, governors, truck brake rigging, and wheel and axle replacement units. Therefore, as a general policy, only very light repairs are made in a station; parts requiring major repairs are replaced with tested units. In the case of the car body, the same policy is maintained. Seats, sash, doors, etc., in need of repairs must be replaced from material furnished by the body overhauling department.

Methods of Storing Replacement Units in the Shops of the New Orleans Public Service, Inc.

1. Section of the electrical repair room showing a number of extra armatures and field coils.
2. Removing motors and disassembling trucks at the Carrollton shop. Extra motors for substitution are stored in the corner at the extreme right of this view.
3. Wheel and axle units at the Magazine shop, ground and ready for replacement.
4. Extra air compressors with motors and railway motors ready to replace worn units.
5. One of the racks in the babbitting room where bearings are stored.

Extra Units Carried by the New Orleans Public Service, Inc., for Replacement

TRUCKS

Complete trucks
- 3 pair 76-E-2.
- 2 pair 39-E.
- 2 pair MCB.

Wheels
- 2 pair drivers for 76-E trucks with GE-263 motors.
- 2 pair drivers for 76-E-2 trucks with Westinghouse 306 motors.
- 4 pair idlers for 76-E-2 trucks.
- 4 pair drivers for 39-E trucks with GE-201 motors.
- 4 pair pony wheels for 39-E trucks.
- 2 pair drivers for MCB trucks with Westinghouse 306 motors.
- 2 pair drivers for MCB trucks with GE-263 motors.
- 4 pair idlers for MCB trucks.
- 1 pair drivers for Lord Baltimore trucks with Westinghouse 514 motors.

Miscellaneous truck parts
- 3 sets journal boxes for 76-E-2 trucks.
- 8 sets pony boxes for 39-E-2 trucks.
- 12 pair axle bearings, babbitt lined, for GE-263 motors.
- 10 journal bearings for 76-E-2 trucks.
- 5 brasses for pony wheels of 39-E-2 trucks.
- 2 MCB truck bolsters.
- 2 body bolsters.
- Several suspension bars for motors.
- Brake equipment under separate head.

MOTORS AND CONTROL

Complete motors
- 12 Westinghouse 306-CB-4.
- 8 GE-263-A.
- 8 GE-57.
- 6 Westinghouse 514.
- 2 GE-247.
- 4 Westinghouse 510.
- 4 GE-265.

Armatures
- 2 Westinghouse 306-CB-4.
- 2 GE-263-A.
- 4 GE-57.

Armature bearings
- 6 pair for Westinghouse 306 motors.
- 6 pair for GE-263 motors.
- 2 pair for GE-57 motors.

Brush holders
- 6 for Westinghouse 306 motors.
- 6 for GE-263 motors.
- 8 for GE-57 motors.
- 3 for Westinghouse 514 motors.
- 3 for GE-247 motors.

Gear cases
- 4 for Westinghouse 306 motors.
- 2 for GE-263 motors.
- 4 for GE-201 motors.
- Extra bottom halves.

Control
- 2 K-35 JJ controllers.
- 14 K-36 controllers.
- 1 set edge-wound resistance for GE-265 motors.
- 2 sets resistors for Westinghouse 306 motors.
- Few sets miscellaneous resistors.

BRAKE EQUIPMENT

Valves
- 1 M-24 air valve.
- 12 PV air valves.
- 6 SL-1 air valves.
- 5 M-1 tripper valves.
- 5 M-1-2A tripper valves.
- 1 reducing valve.
- 1 No. 14 double check valve.

Air compressors and motors
- 4 General Electric CP-27.
- 2 Westinghouse DH-16.
- 2 Westinghouse D-1-H.

Miscellaneous brake equipment
- 3 compressor cylinders, 8x12 in.
- 20 compressor cylinders, 10x12 in.
- 4 jam cylinder piston rods.
- 6 Westinghouse S-6 air governors.
- 1 General Electric ML air governor.
- 1 Westinghouse S-16 air governor.
- 6-31 brake shoes (25 ordered when supply reaches 6).
- 8 slack adjusters.
- Several brake levers, rods, equalizers and other parts of the brake rigging.

ELECTRICAL AND BODY

Overhead line breakers
- 10 General Electric MR-12.
- 10 Westinghouse 6-11-A.
- 5 General Electric MR-22-A.

Line breakers
- 5 General Electric 976.
- 5 Westinghouse 801-E.
- 3 General Electric DB-987.
- 1 Westinghouse UM-2-A.

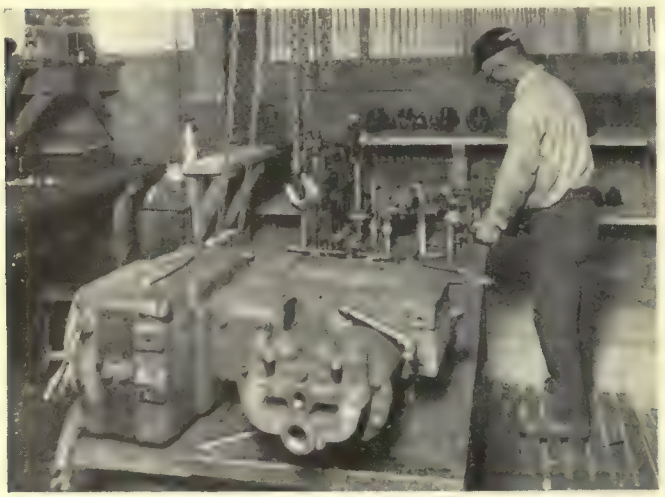
Lightning arrester jars
- 12 sets for General Electric 2-cell aluminum arresters.
- 12 sets for Westinghouse LA aluminum arresters.

Miscellaneous
- 2 complete sets of lightning arresters.
- 12 Ohio Brass trolley catchers.
- 6 National Pneumatic door engines.
- 1 fender.
- 2 H-B life guards.
- Many miscellaneous smaller parts, ordered from storeroom.

One class of work that is still carried on in the stations is the grinding of wheels. Wheels are changed at the station because this work can be done in a fraction of the time required for sending a car to the overhauling shop. Other work carried on by the stations besides the 1,000-mile inspection and the grinding of wheels consists of car oiling, cleaning, washing, emergency wrecker service, sanding and sprinkling.

From the foregoing it should not be thought that a great many equipment units require replacement in the stations. In reality, there is very little of this type of work done. Extra units are carried only to insure that cars are not sent out with equipment that is likely to fail. Why there are few replacements of equipment units due to failure is answered by the thorough method of overhaul.

All equipment changes made at the stations are reported to the superintendent's office on an "equipment change report," one of which is shown in an accompanying illustration. In this way a close check is maintained on all changes in equipment due to failure. This same form is used by the overhauling department. By triplicating the reports a complete record of the equipment on every car is maintained at the superintendent's office, the overhauling department and at the station.



Air compressors, governors, valves and other air equipment are overhauled in this room and held in reserve

All overhauling work is divided into two parts: first, car equipment overhauling, and second, car body overhauling and painting. Car equipment is overhauled on a 40,000 car-mile basis, the work being done at the Carrollton shop; car bodies are overhauled on an eighteen to twenty months' schedule, the work being done at the Magazine shop.

When a car has completed its 40,000 miles of service, it is sent to the car equipment overhauling department by order of the superintendent. This department is handled by a foreman who is responsible for the supervision of the shop employees. A shop engineer works with him and is responsible for the electrical or mechanical testing of every piece of equipment on an overhauled car, and for the general performance of the car itself. Records are kept of the mileage of the cars and they are summoned for overhaul at approximately the 40,000-mile mark, but the exact figure depends on conditions at the shop. By watching the records and properly summoning cars, an even flow is maintained through the shop.

When a car is received the following equipment is removed for overhaul: trucks with motors, air compressors, air governors, air equipment boxes, jam cylinders, door engines, slack adjusters, air intake strainers, line breakers, circuit breakers, lightning arresters, rheostats, trolley bases and trolley catchers. Other equipment, which may require removal for overhaul, depending on its condition, consists of motorman's brake valves, air reservoirs, air gages, miscellaneous air valves, controllers, buzzers, life guards, door and step mechanism, register rods and straps, foot gongs, stanchions or grab handles, handstraps, motorman's steps and headlights. In general,

every piece of equipment must be gone over thoroughly.

Although most of the above parts are removed at each overhaul, because of the use of the unit replacement system, it is not necessary to hold the car until all of this original equipment is ready to be reassembled. As many extra parts as possible that have previously been overhauled are placed on the car and work concentrated on those units which are not replaceable. By this method the overhauling can be done on a steady production basis, permitting the cars to be quickly reequipped with tested units. In an accompanying table are listed some of the many extra units which are retained as surplus parts at the Carrollton shop. As will be noted a sufficient number are kept to allow a great amount of flexibility in the overhaul work. Since the maintenance methods used by the New Orleans Public Service have been described in detail in previous articles in the JOURNAL they will not be outlined here. It is sufficient to say that all overhaul work is conscientiously and thoroughly done. The activities of this department are extremely detailed and are followed up continuously by the shop foreman and the shop engineer.



Section of the electrical equipment department where line breakers, circuit breakers, lightning arresters and other apparatus are overhauled

In reality the overhauling of a car body every eighteen to twenty months is a light overhaul and is classified as a "touch-up and varnish" job. At this time the doors, vestibule sash, side sash, seat bottoms, side curtains, motorman's curtains, sign box curtains, registers, register straps and bell ropes are removed from the car. Necessary carpenter work is done on the car body, after which it is painted. Removed doors, sash and seat bottoms are repaired if necessary and painted, curtains are given attention, registers overhauled, and register straps and bell ropes replaced if necessary.

When the condition of the car body requires a general overhaul, all equipment is stripped from the car, the necessary sheet metal or carpenter work is done, the old paint is burned off, and the paint surface restored, this job requiring about twelve days.

In the car body overhauling, as in the mechanical and electrical equipment overhauling, as many repaired units are substituted as is possible, in order to reduce the period of inactive service to a minimum.

Buses of the New Orleans Public Service, Inc., are inspected on four bases: daily, every 2,000 miles, every 20,000 miles and every 40,000 miles. No parts are replaced on the bus following the daily inspection, unless some serious defect is found. On the 2,000-mile inspection also all parts are examined and gone over carefully, but none replaced unless necessary. On the 20,000-mile inspection, however, a number of parts are replaced with overhauled and tested units. Among these are the vacuum tank, distributor, cylinder heads, junk heads, lighting generator, starter and horn.

In making the regular 40,000-mile inspection a still greater number of units are replaced. No individual parts of the engine are removed; the entire engine is taken out and replaced. Other units which are replaced with rebuilt ones are the steering gear, gas tank, clutch, transmission, air compressor, lighting generator, starter and horn. On the gas-electric buses the generator and driving motors are replaced with dipped, baked and tested units. Carrying the unit replacement system still further in the overhaul work, the company replaces a number of units with rebuilt ones, even in overhauling its bus engines. Among these units are the cylinder heads, water pump, carburetor and distributor or magneto.

EQUIPMENT CHANGE REPORT

NEW ORLEANS PUBLIC SERVICE INC.
ROLLING STOCK AND SHOPS DEPARTMENT

CAR No.: _____ MILEAGE _____

STATION _____ DATE _____

MOTORS

REMOVED						REPLACED BY			
TYPE	SERIAL No. FRAME	SERIAL No. ARMATURE	CAUSE OF REMOVAL	DATE	END No.	TYPE	SERIAL No. FRAME	SERIAL No. ARMATURE	DATE

RESISTORS

REMOVED					REPLACED BY		
TYPE	SERIAL No.	CAUSE OF REMOVAL	DATE	END No.	TYPE	SERIAL No.	DATE

CONTROLLERS

CIRCUIT BREAKERS

LINE BREAKER

LIGHTNING ARRESTER

AIR COMPRESSOR

GOVERNOR

MOTORMAN'S BRAKE VALVES

TRUCKS

REGISTERS

DOOR ENGINES

MISCELLANEOUS

Returned to _____ Station _____ Date _____

Per: _____ Repair Foreman. Checked by _____ Engineer

All equipment changes made in the five stations and the Carrollton shop are reported on the above form

1929 Was a GOOD YEAR

Gross and net revenues are holding steady, and on a large proportion of properties there has been an increase of business over 1928. Analysis of annual reports from 65 companies in this country and abroad presents significant operating statistics

LAST year was a good one from the standpoint of electric railway operation. This is becoming more and more apparent as the annual reports of the properties become available. While there have been few outstanding increases in revenue, there have been few declines. Many companies have had an actual increase in passengers carried, although others have suffered losses varying in amount. The most marked result, however, is a reduction in operating expense that practically offsets losses in gross on the various properties, so that the net operating revenue is as good as or better than it was in the preceding year.

Up to the present time 65 reports for the calendar year 1929 or for various periods terminating within the year have become available. Sixty of these are for electric railway properties in the United States and Canada. Taken together, they present a fair average of the financial results of the year. In size the companies range from small properties, some with considerably less than $1,000,000 operating revenue, to the largest in the country. Of the 60 companies in the United States and Canada, twelve had revenues of less than $1,000,000, 33 had revenues of $1,000,000 to $10,000,000, and fifteen had revenues in excess of the larger figure. Only those companies operating railway or bus lines exclusively, or those larger utilities which present separate reports for their railway departments, are included in Table I. The entire survey, therefore, covers local transportation lines only.

The reports as published differ widely in form, depending on the primary purpose for which they were prepared. Most of them follow the standard accounting form, and this has been adopted for the presentation in the tables, as it was in the analysis of reports presented in this paper last year. Some of the others, which did not follow this form exactly, could be brought in line with little difficulty. In this way they have been made fairly comparable. In some instances comparisons between 1929 and the preceding year were not available in the latest report. However, they were presented in previous reports and have been included for comparison. In a few instances the cumulated monthly reports have been used as the source of the figures. These are subject to minor adjustments, but the totals will be affected but little.

One significant fact that stands out in analyzing the figures is that there was no marked change in revenue for the year, as compared with the preceding period. Despite all difficulties these 60 companies were able to take in revenues that in the aggregate differed but little from those of the previous year. This is the more worthy of note, in that companies of all sizes were con-

Table I—Condensed Financial Reports of Electric Railway Properties, 1929-1928

	Glendale & Montrose Ry., Glendale, Cal.		Petaluma & Santa Rosa R.R., Petaluma, Cal.		Market Street Railway, San Francisco, Cal.		Municipal Railway, San Francisco, Cal.		Denver Tramway Corp., Denver, Col.	
	1929	1928	1929	1928	1929	1928	1929[2]	1928[2]	1929	1928
Railway operating revenue	$80,018	$81,505	$511,088	$595,281	$9,590,194	$9,754,461	$3,499,703	$3,477,665	$4,214,297	$4,310,040
Railway operating expenses	92,976	95,336	418,661[1]	473,453[1]	8,041,926[1]	8,327,688[1]	3,469,118	3,362,293	2,902,564	2,852,496
Net revenue, railway oper.	*$12,957*	*$14,831*					$30,584	$115,372	$1,311,733	$1,457,544
Taxes	4,452	3,801					[3]	[3]	494,201	506,504
Operating income	*$17,410*	*$18,632*	$92,427	$121,828	$1,548,268	$837,513	$30,584	$115,372	$817,532	$951,040
Non-operating income	1,560	1,302	13,291	11,469			34,277	88,448	46,888	39,077
Gross income	*$15,850*	*$16,330*	$105,718	$133,297	$1,548,268	$837,513	$64,861	$203,820	$864,420	$990,118
Deductions from gross income			36,111	36,890			153,486	163,262	513,283	529,158
Net income			$69,607	$96,407	$837,513[16]	$677,755[16]	*$88,624*	$40,558	$351,137	$460,960
Operating ratio	1.162	1.169					0.991	0.966	0.688	0.662

	Connecticut Company, New Haven, Conn.		Capital Traction Co., Washington, D. C.		Washington Ry. & Electric Co., Washington, D. C.		Jacksonville Traction Co., Jacksonville, Fla.		Honolulu Rapid Transit Co., Honolulu, T. H.	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue	$13,399,101	$13,734,222	$4,296,906	$4,344,148	$5,789,979	$5,783,826	$1,141,139	$1,199,516	$1,063,167	$1,087,504
Railway operating expenses	10,546,906	10,759,127	3,067,371	3,054,981	4,787,343[1]	4,731,042[1]	928,589	971,149	737,800	752,531
Net revenue, railway oper.	$2,852,195	$2,975,095	$1,229,534	$1,289,167			$212,550	$228,367	$325,367	$334,972
Taxes	678,174	725,357	327,591	346,965			108,890	106,774	105,832	147,282
Operating income	$2,174,021	$2,249,738	$901,943	$942,202	$2,610,738[17]	$2,484,151[17]	$103,657	$121,591	$219,535	$187,690
Non-operating income	146,046	154,641	26,868	31,924			*6,125*	*6,437*	2,012	2,458
Gross income	$2,320,067	$2,404,379	$928,811	$974,126	$2,610,738	$2,484,151	$97,532	$115,154	$221,547	$190,149
Deductions from gross income	1,289,727	1,373,431	366,837	353,720	699,503	750,196	157,953	164,018	6,600	6,600
Net income	$1,030,340	$1,030,948	$561,974	$620,406	$1,911,234	$1,733,967	*$60,420*	*$48,863*	$214,947	$183,549
Operating ratio	0.787	0.783	0.713	0.704			0.813	0.809	0.694	0.692

(See Page 207 for Footnotes)

or the Electric Railways

sidered. Referring to Table II, it will be seen that in general the largest companies had the greatest number of instances of increases in revenue. Eleven out of fifteen in this class showed gains. This was due to an actual increase in traffic on most of them, since there were relatively few changes in fare during the year. As would be expected, the greatest losses in revenue occurred on the smaller properties, three showing increases and nine showing losses. The medium-sized companies were almost evenly balanced in comparative earnings with the year previous, sixteen taking in more gross and seventeen less.

The most marked effect in the year just past is the reduction in operating expense. Economies were effected in companies in all the classifications. It is rather remarkable, however, that the most marked savings in operation took place in both the largest and the smallest groups. Of the small companies, only two increased their expenses, while ten were able to reduce them.

Table II—Significant Changes in Operation, 1928-1929 Classified According to Size of Properties

	Annual Gross Revenue: Less than $1,000,000	$1,000,000 to $10,000,000	More than $10,000,000	Grand Total
Total number of companies.. ..	12	33	15	60
Gross revenue:				
Increased in 1929.....	3	16	11	30
Decreased in 1929.....	9	17	4	30
Operating expenses:				
Increased in 1929.....	2	16	4	24
Decreased in 1929.....	10	17	11	36
Operating income:				
Increased in 1929.....	8	15	11	34
Decreased in 1929.....	4	18	4	26

Table III—Range of Operating Ratios in 1929, Arranged According to Size of Properties

	Annual Gross Revenue: Less than $1,000,000	$1,000,000 to $10,000,000	More than $10,000,000	Grand Total
Total number of companies.. ..	12	33	15	60
Range of operating ratios:				
Above 1.00..	1	0	0	1
0 90-1 00.	1	1	0	2
0 80-0 90.	1	6	1	8
0 70-0 80.....	2	11	9	22
Below 0 70.....	2	6	3	11
Figures not available..... ..	5	9	2	16

Table I—(Continued)—Condensed Financial Reports of Electric Railway Properties, 1929-1928

	Chicago North Shore & Milwaukee R.R., Chicago, Ill.		Chicago Rapid Transit Co., Chicago, Ill.		Chicago Surface Lines, Chicago, Ill.		Chicago & West Towns Ry., Oak Park, Ill.		Gary Railways, Gary, Ind.	
	1929	1928	1929	1928	1930[7]	1929[7]	1929	1928	1929	1928
Railway operating revenue....	$8,020,762	$7,967,186	$21,106,491	$19,995,277	$62,717,867	$62,391,622	$1,567,333	$1,515,529	$1,293,442	$1,240,522
Railway operating expenses....	5,913,692	5,928,425	14,772,550	14,238,630	46,015,703	45,401,067	1,160,977[1]	1,124,543[1]	1,051,769[11]	970,534
Net revenue, railway oper...	$2,107,070	$2,038,762	$6,333,941	$5,756,647	$16,702,164	$16,990,555			$241,673	$269,988
Taxes.....	380,086	395,596	1,848,611	1,843,112	3,235,000	3,560,000			59,248	63,113
Operating income.....	$1,787,612[18]	$1,702,768[18]	$4,485,330	$3,913,535	$13,467,164[8]	$13,430,555[8]	$406,356	$390,986	$182,424	$206,875
Non-operating income.....	380,711	426,467	267,098	268,975					6,886	2,416
Gross income.....	$2,168,323	$2,129,234	$4,752,428	$4,182,510			$406,356	$390,986	$189,311	$209,291
Deductions from gross income..	1,445,257	1,347,513	3,682,948	3,540,195			177,368	153,051	118,295	118,609
Net income.....	$723,065	$781,721	$1,069,479	$642,314			$228,988	$237,935	$71,015	$90,681
Operating ratio.....	0.737	0.744	0.700	0.712	0.733	0.728			0.815	0.780

	Indianapolis, Crawfordsv. & Danville E. Ry., Indianapolis, Ind.		Indianapolis & Martinsville R. T. Co., Indianapolis, Ind.		Indianapolis & Northwestern Trac. Co., Indianapolis, Ind.		Indianapolis Street Ry., Indianapolis, Ind.		Terre Haute, Indpls. & E. Trac. Co., Indianapolis, Ind.	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue....	$230,129	$267,117	$136,035	$139,362	$364,331	$411,387	$5,044,817	$5,213,775	$5,050,541	$5,122,184
Railway operating expenses....	239,369[1]	284,942[1]	142,823[1]	163,802[1]	372,958[1]	452,139[1]	3,688,857	3,857,220	3,739,314[1]	4,119,917[1]
Net revenue, railway oper....							$1,355,960	$1,356,555		
Taxes.....							308,313	289,303		
Operating income.....	*$9,240*	*$17,825*	*$6,788*	*$24,440*	*$8,627*	*$40,752*	$1,047,647	$1,067,252	$1,311,227	$1,002,267
Non-operating income.....										
Gross income.....	*$9,240*	*$17,825*	*$6,788*	*$24,440*	*$8,627*	*$40,752*	$1,047,647	$1,067,252	$1,311,227	$1,002,267
Deductions from gross income..	59,500	59,500	38,000	38,000	124,000	124,000	640,037	663,839	1,151,660	1,128,518
Net income.....	*$68,739*	*$77,325*	*$44,788*	*$62,439*	*$132,627*	*$164,753*	$407,610	$403,413	$159,567	*$126,251*
Operating ratio.....							0.731	0.739		

	Chicago, South Shore & S. Bend R.R., Michigan City, Ind.		Louisville Railway, Louisille, Ky.		Androscoggin & Kennebec Ry., Lewiston, Me.		United Rys. & Elec. Co. of Baltimore, Baltimore, Md.[14]		Washington, Balto.- & Annapolis Elec. Ry., Baltimore, Md.	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue....	$3,691,578	$3,060,539	$4,820,901	$4,847,000	$784,548	$822,922	$16,717,099	$16,273,806	$2,537,511	$2,488,236
Railway operating expenses....	3,043,742	2,536,527	3,465,693	3,494,755	684,343	680,943	11,335,024	10,873,921	2,019,485	1,864,024
Net revenue, railway oper....	$647,835	$524,011	$1,355,208	$1,352,244	$100,205	$141,979	$5,382,075	$5,399,884	$518,026	$624,212
Taxes.....	60,817	51,403	461,000	462,268	20,487	29,356	1,635,733	1,578,782	139,888	131,271
Operating income.....	$587,017	$472,608	$894,208	$889,976	$79,718	$112,622	$3,746,342	$3,821,102	$378,138	$482,941
Non-operating income.....	60,246	45,262	89,666	86,107			175,591	150,823	5,911	11,009
Gross income.....	$647,264	$517,870	$983,874	$976,084	$79,718	$112,622	$3,921,934	$3,971,926	$384,050	$503,950
Deductions from gross income..	227,974	517,286	639,720	643,032	68,275	68,560	3,387,077	3,413,532	585,459	561,279
Net income.....	$419,290	$583	$344,154	$333,051	$11,443	$44,062	$534,856	$558,394	*$201,409*	*$57,329*
Operating ratio.....	0.823	0.829	0.719	0.721	0.872	0.827	0.678	0.667	0.796	0.748

(See Page 207 for Footnotes)

Among the large companies, eleven out of the fifteen reduced their operating costs. The medium-sized group, where it might be expected large savings could be effected, showed correspondingly less gain in this direction, seventeen having lower costs and sixteen higher. Altogether, 36 out of the 60 properties were able to effect reductions in total operating expense.

That the combination of increased earnings on many properties and operating economies on them and on some of the others where business declined was effective

Table I—(Continued)—Condensed Financial Reports of Electric Railway Properties, 1929-1928

	Boston Elevated Railway Boston, Mass.		Boston, Revere Beach & Lynn R.R., Boston, Mass.		Eastern Massachusetts St. Ry., Boston, Mass.		Fitchburg & Leominster St. Ry., Fitchburg, Mass.		Union Street Railway, New Bedford, Mass.	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue	$34,096,623	$34,843,147	$1,271,014	$1,222,093	$8,579,454	$9,005,758	$338,463	$353,771	$1,283,222	$1,286,624
Railway operating expenses	24,024,747	24,900,188	1,002,418	1,068,548	6,358,654	6,714,403	309,778[13]	264,316[1]	1,120,118	1,165,964
Net revenue, railway oper.	$10,071,876	$9,942,959	$268,596	$153,544	$2,220,799	$2,291,354	$28,685		$163,104	$120,660
Taxes	1,619,962	1,721,678	33,769	43,896	351,182	364,759	5,333		61,059	58,713
Operating income	$8,451,914	$8,221,281	$234,827	$109,648	$1,869,616	$1,926,595	$23,351	$89,455	$1,020,045	$61,947
Non-operating income			2,854	2,843	229,744	242,360			1,361	1,251
Gross income	$8,451,914	$8,221,281	$237,681	$112,591	$2,099,361	$2,168,955	$23,351	$89,455	$103,406	$63,198
Deductions from gross income	8,357,842	8,181,230	147,161	50,696	1,098,658	1,176,166	18,748	86,807[13]	16,180	12,465
Net income	$94,072	$40,051	$90,520	$61,894	$1,000,703	$992,789	$4,603	$2,648	$87,223	$50,733
Operating ratio	0.706	0.715	0.788	0.874	0.741	0.746	0.915		0.873	0.906

	Middlesex & Boston St. Ry., Newtonville, Mass.		Department of Street Railways, Detroit, Mich.		Grand Rapids Railroad, Grand Rapids, Mich.		Duluth-Superior Traction Co., Duluth, Minn.		Twin City Rapid Transit Co., Minneapolis, Minn.	
	1929	1928	1929[15]	1928[15]	1929	1928	1929	1928	1929	1928
Railway operating revenue	$1,164,390	$1,176,281	$26,444,874	$24,668,175	$1,555,166	$1,574,170	$1,780,428	$1,873,330	$13,487,976	$13,005,353
Railway operating expenses	1,003,534[1]	999,032[1]	21,057,542	19,283,497	975,116	957,624	1,476,498	1,535,169	9,930,434	9,950,552
Net revenue, railway oper.			$5,387,332	$5,384,677	$580,050	$616,546	$303,929	$338,160	$3,557,542	$3,054,801
Taxes			750,948	783,012	128,422	133,617	147,770	153,561	1,201,924	1,098,849
Operating income	$160,856	$177,249	$4,636,383	$4,601,664	$451,627	$482,929	$156,159	$184,599	$2,355,618	$1,955,952
Non-operating income			118,396	245,586			25,579	33,794	121,978	99,281
Gross income	$160,856	$177,249	$4,754,779	$4,847,251	$451,627	$482,929	$181,739	$218,393	$2,477,596	$2,055,233
Deductions from gross income	156,367	160,693	1,651,590	1,914,896	235,915	240,914	168,983	169,171	1,221,718	1,221,643
Net income	$4,489	$16,556	$3,103,189	$2,932,355	$215,712	$242,014	$12,756	$49,222	$1,255,878	$833,590
Operating ratio	0.862	0.849	0.796	0.782	0.627	0.609	0.830	0.819	0.735	0.765

	Kansas City Public Service Co., Kansas City, Mo.		Illinois Terminal Co., St. Louis, Mo.		St. Louis Public Service Co., St. Louis, Mo.		Public Service Co-ordinated Transport, Newark, N. J.		International Railway, Buffalo, N. Y.	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue	$8,951,616	$8,490,282	$7,163,425	$6,717,136	$19,249,779	$19,451,917	$34,732,658	$34,719,509	$10,975,851	$11,116,652
Railway operating expenses	7,327,003[1]	6,242,470	5,025,476	4,902,473	14,326,528	14,616,828	28,588,849[1]	29,268,099[1]	8,291,542	8,336,905
Net revenue, railway oper.		$2,247,812	$2,137,949	$1,814,663	$4,923,251	$4,835,089			$2,684,309	$2,779,748
Taxes		505,530	264,072	305,320	1,922,814	1,885,450			744,601	749,918
Operating income	$1,624,613	$1,621,456[19]	$1,873,744	$1,509,255	$2,954,059[20]	$2,876,247[20]	$6,143,809	$5,451,410	$1,939,707	$2,029,829
Non-operating income					51,304	40,319	144,166	150,842	92,621	56,912
Gross income	$1,624,616	$1,621,456	$1,374,551[12]	$1,066,786[12]	$3,005,363	$2,916,566	$6,287,975	$5,602,253	$2,032,329	$2,086,742
Deductions from gross income	926,393	875,973			1,849,902	1,873,165	6,531,227	5,779,373	1,291,128	1,352,998
Net income	$698,223	$745,432			$1,155,461	$1,043,401	*$243,251*	*$177,120*	$740,200	$733,744
Operating ratio		0.735	0.701	0.729	0.744	0.751			0.754	0.750

	Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.		Hudson & Manhattan R.R., New York, N. Y.		Long Island Railroad, New York, N. Y.		New York, Westchester & Boston Ry., New York, N. Y.		Staten Island Rapid Transit Co., New York, N. Y.	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue	$1,025,933	$1,036,155	$12,517,756	$12,388,927	$41,326,194	$40,532,572	$2,530,488	$2,390,398	$2,637,897	$3,127,661
Railway operating expenses	760,871	749,352	6,248,096[1]	6,425,643[1]	27,734,679	28,434,357	1,570,218	1,622,858	1,892,347	2,103,175
Net revenue, railway oper.	$265,061	$286,803			$13,591,515	$12,098,215	$960,270	$767,540	$745,550	$1,024,486
Taxes	70,775	75,963			2,922,226	2,688,837	275,817	239,672	210,265	225,874
Operating income	$194,285	$210,839	$6,269,659	$5,963,283	$10,649,328	$9,390,508	$684,452	$527,868	$535,285	$798,612
Non-operating income	122,767	101,705					12,460	12,653		
Gross income	$317,053	$312,545	$6,269,659	$5,963,283	$8,707,943[12]	$7,542,458[12]	$696,912	$540,522	$460,515[12]	$349,650[12]
Deductions from gross income	381,130	382,786	4,022,449	4,022,226			2,667,847	2,448,950		
Net income	*$64,077*	*$70,240*	$2,247,210	$1,941,057			*$1,970,935*	*$1,908,428*		
Operating ratio	0.741	0.723			0.671	0.702	0.621	0.679	0.719	0.672

	Cleveland Railway, Cleveland, Ohio		Community Traction Co., Toledo, Ohio		Altoona & Logan Valley Elec Ry., Altoona, Pa.		Fairmount Park Transit Co., Philadelphia, Pa.		Philadelphia Rapid Transit Co., Philadelphia, Pa.	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue	$18,403,945	$18,272,040	$3,887,020	$3,691,071	$1,229,007	$1,246,361	$338,032	$487,366	$55,909,553	$55,835,522
Railway operating expenses	15,685,627	15,065,213	2,819,610	2,565,165	813,123[1]	862,930[1]	239,619	391,114	38,666,747	38,935,149
Net revenue, railway oper.	$2,718,317	$3,206,826	$1,067,410	$1,125,906			$98,413	$96,252	$17,242,806	$16,900,372
Taxes	1,210,870	1,261,527	235,331	230,356			26,794	27,698	3,310,797	3,402,066
Operating income	$1,507,447	$1,945,299	$832,079	$895,550	$415,884	$383,431	$71,619	$68,554	$13,932,008	$13,498,306
Non-operating income	171,857	275,707							1,243,331	1,390,208
Gross income	$1,679,304	$2,221,007	$832,079	$895,550	$415,884[6]	$383,431[6]	$71,619	$68,554	$15,175,339	$14,888,514
Deductions from gross income	2,512,754	2,530,953	363,268	321,929	182,150	183,693	24,511	26,313	10,837,831	11,361,425
Net income	*$833,449*	*$309,946*	$468,810[9]	$573,620[9]	$233,734	$199,738	$47,108	$42,241	$4,337,508	$3,527,089
Operating ratio	0.852	0.824	0.725	0.695			0.709	0.802	0.691	0.697

(See Page 207 for Footnotes)

is seen from the change in operating income. Among the 60 companies, 34 were able to show a greater operating income after deducting operating expenses and taxes. In this figure lies the real measure of effectiveness of the operating policy followed for the year. Again it is significant that the groups containing the largest and the smallest railways are the ones which had the greatest gains in net. Eight of the twelve small companies made a better showing in this respect than they did in 1928, and eleven of the fifteen large companies showed similar gains. In the middle group, fifteen companies showed gains and eighteen showed reductions from 1928.

Operating ratios fall within a range not far different from that indicated last year. Only one small company had an operating ratio of more than 1.00. Three small companies for which operating expenses and taxes are not separated were not able to cover both these items of expense out of revenue. They are part of a larger system which as a whole was able to pay expenses by a considerable margin. The remaining 56 companies analyzed were able to pay operating expenses out of receipts. One small and one medium-sized company had operating ratios between 0.90 and 1.00. Thus 41 out of 44 companies for which information was available were able to keep their operating ratios below 0.90. This speaks well for the efficiency of management. At that, only one small, one large, and six middle sized properties had higher than 0.80 for the operating ratio.

Although it sometimes has been questioned whether the small companies are able to operate efficiently, two of those with receipts of less than $1,000,000 were able to operate at less than 0.70. These are both interurban railways, the Galveston-Houston Electric Railway, with a ratio of 0.563, and the Charleston Interurban Railroad, with 0.614. The six companies with ratios below 0.70 in the middle class are the Denver Tramway, 0.688; the Honolulu Rapid Transit Company, 0.694; the Grand Rapids Railroad, 0.627; the New York, Westchester &

Table I—(Continued)—Condensed Financial Reports of Electric Railway Properties, 1929-1928

	United Electric Railways, Providence, R. I.		Dallas Ry. & Terminal Co., Dallas, Tex.		Texas Electric Railway, Dallas, Tex.		Galveston-Houston Electric Ry., Houston, Texas		Houston Electric Co., Houston, Texas	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue	$7,421,195	$7,423,475	$3,319,132	$3,260,569	$1,866,307	$1,825,753	$584,490	$643,800	$3,375,857	$3,343,294
Railway operating expenses	6,423,874[1]	6,482,551[1]	2,329,455[1]	2,479,277[1]	1,177,584	1,121,438	329,020	373,360	2,085,804	2,059,957
Net revenue, railway oper.					$688,723	$704,315	$255,470	$270,440	$1,290,053	$1,283,337
Taxes					69,567	65,855	32,356	31,768	273,926	291,672
Operating income	$920,876	$940,924	$989,677	$781,292	$619,156	$638,459	$223,113	$238,671	$1,016,125	$991,664
Non-operating income	86,630	86,559					193		11,730	
Gross income	$1,007,506	$1,027,483	$989,677	$781,292	$619,156	$638,459	$223,306	$238,671	$1,027,859	$991,664
Deductions from gross income	610,269	616,886	879,961		417,865	417,877	269,960	269,809	398,669	410,701
Net income	$397,237	$410,597	$109,716		$201,291[4]	$220,582[4]	*$46,654*	*$31,138*	$629,190	$580,963
Operating ratio					0.631	0.615	0.563	0.579	0.618	0.616

	Pacific Northwest Traction Co., Seattle, Wash.		Charleston Interurban R.R., Charleston, W. Va.		Madison Railways, Madison, Wis.		Ottawa Electric Railway, Ottawa, Ont.		Montreal Tramways, Montreal, P. Q.	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Railway operating revenue	$964,072	$881,076	$839,938	$800,460	$436,165	$439,865	$1,887,123	$1,855,907	$15,669,911	$14,938,678
Railway operating expenses	717,375	736,776	516,077	546,295	343,197[1]	349,250[1]	1,550,342[1]	1,314,349[1]	11,431,166	11,503,314[1]
Net revenue, railway oper.	$246,697	$144,300	$323,861	$254,165					$4,238,745	
Taxes	54,176	51,644	79,416	79,416					476,342	
Operating income	$192,518	$92,654	$244,445	$174,749			$336,781	$541,558[4]	$3,762,403	$3,435,364
Non-operating income										
Gross income	$192,518	$92,654	$244,445	$174,749	$92,968	$90,615	$336,781	$541,558[4]	$3,762,403	$3,435,364
Deductions from gross income	116,215	155,255	111,399	110,372	61,365	71,655	182,589		3,634,086	2,935,364
Net income	$76,303	*$62,601*	$133,047	$64,377	$31,603	$18,960	$154,192		$128,316	$500,000
Operating ratio	0.744	0.836	0.614	0.682					0.729	

	Havana Electric Ry., Havana, Cuba		Underground Electric Rys., London, England[10]		Christchurch Tramway Board, Christchurch, N. Z.		New South Wales Govt. Tramways, Sydney, N. S. W.		Melbourne & Metropolitan Tramways Bd. Melbourne, Vic., Aus.	
	1929	1928	1929	1928	1929[16]	1928[16]	1929[2]	1928[2]	1929[2]	1928[2]
Railway operating revenue	$5,694,051	$5,415,175	£15,097,592	£14,941,553	£265,363	£273,761	£4,457,890	£4,556,561	£2,435,548	£2,494,100
Railway operating expenses	4,608,568[1]	4,494,473[1]	12,288,229[1]	12,046,381[1]	183,462	193,962	3,835,644	3,937,356	1,704,678	1,722,967
Net revenue, railway oper.										
Taxes										
Operating income	$1,085,483	$920,702	£2,809,363	£2,895,172	£82,101	£79,799	£622,246	£619,205	£730,870	£771,133
Non-operating income	31,457	39,171	1,080,003	1,052,917						
Gross income	$1,116,940	$959,873	£3,889,366	£3,948,089	£82,101	£79,709	£622,246	£619,205	£730,870	£771,133
Deductions from gross income	643,360	643,951	2,738,940	2,774,902	69,258	82,970	631,589	591,397	345,885	325,955
Net income	$473,580[4]	$315,922[4]	£1,150,426	£1,173,187	£12,843	*£3,171*	*£9,343*	£27,808	£384,985	£445,178
Operating ratio										

Italic figures indicate deficit.
[1]Includes taxes.
[2]Years ended June 30.
[3]For comparative purposes taxes are computed for 1929 at $332,402 and for 1928 at $328,116.
[4]Before depreciation.
[5]After deducting depreciation of $3,572,648 in 1929 and $2,907,939 in 1928.
[6]After depreciation.
[7]Years ended Jan. 31.
[8]Includes City's 55 per cent of divisible net receipts.
[9]These figures represent balance transferred to stabilizing fund. In 1929 after adjustment for taxes, power refund and payment of bond interest and dividends on preferred stock the net increase in stabilizing fund was $45,387; in 1928 after similar action the net increase in stabilizing fund was $125,150.
[10]Combined statement of "common fund" companies.
[11]Deduction of $64,335 for retirements from this amount was made in 1929.
[12]Net after equipment and joint facility rents.
[13]Includes depreciation.
[14]Subject to adjustments.
[15]Twelve-month statement for calendar year.
[16]Before depreciation and federal taxes; Years ended Mar. 31.
[17]Net revenue from auxiliary operations, $1,605,102 in 1929 and $1,431,367 in 1928.
[18]Net revenue from auxiliary operations, $6,628 in 1929 and $59,602 in 1928.
[19]Net deficit from auxiliary operations, $120,828.
[20]Net deficit from auxiliary operations, $46,377 in 1929 and $73,391 in 1928.

Table IV—Electric Railways or Controlled Bus Companies on Which the Passengers Carried in 1929 Exceeded Those in 1928

Company	Increase Per Cent 1929 Over 1928
Aurora, Elgin & Fox River Electric Company, Aurora, Ill.	2.81
Chicago & Joliet Electric Railway	3.98
Chicago Surface Lines	1.00
Illinois Northern Utilities Company, Freeport	10.37
Illinois Power & Light Corporation, Galesburg	1.48
Illinois Power & Light Corporation, Peoria	3.93
Chicago, South Shore & South Bend, Michigan City, Ind.	15.40
Gary Railways Company	4.86
Indiana Service Corporation, Ft. Wayne	8 54
Southern Indiana Gas & Electric Company, Evansville	1.22
Houghton County Traction Company, Houghton, Mich.	0.33
Saginaw Transit Company, Saginaw, Mich.	1.73
Public Service Co-ordinated Transport, Newark, N. J.	0.02
Salem & Penns Grove Traction Company	8.29
Manhattan & Queens Traction Corporation	1.59
Interborough Rapid Transit Company	3 94
New York Rapid Transit Corporation	3.84
Poughkeepsie & Wappingers Falls Railway	1.48
Third Avenue Railway System	3.39
Community Traction Company, Toledo	5.22
Dayton & Troy Electric Railway	11.14
Dayton & Western Traction Company	0.38
Ohio Public Service Company, Mansfield, Ohio	6.43
Pennsylvania-Ohio Public Service Company, Youngstown	0.56
Altoona & Logan Valley Electric Railway	1.00
Beaver Valley Motor Coach Company, New Brighton, Pa.	7.39
Beaver Valley Traction Company	0.79
Citizens Transit Company, Oil City, Pa.	16.07
East Penn Traction Company, Pottsville, Pa.	74.55
Lewistown & Reedsville Electric Railway	1.70
Pittsburgh Motor Coach Company	20.35
Milwaukee Electric Railway & Light Company	1.19
Northern States Power Company, Eau Claire, Wis.	10.55
Wisconsin Power & Light Company, Madison	4.83
Alabama Power Company	1.24
Atlanta Coach Company	14 67
Kentucky Utilities Company, Paducah	1.85
Gulfport & Mississippi Coast Traction Company	10.06
Lynchburg Traction & Light Company	0.99
Virginia Public Service Company, Hampton	1 60
Des Moines & Central Iowa Railroad	5.21
Des Moines Railway	5.08
Mason City & Clear Lake Railroad, Mason City, Iowa	6.71
Tri City Railway, Davenport, Iowa	8.70
Waterloo, Cedar Falls & Northern Railway	5.16
Mississippi Valley Public Service Company	3.62
Missouri Power & Light Company, Jefferson City	3.52
St. Joseph Railway, Light, Heat & Power Company	2.99
Butte Electric Railway	10.00
Utah Rapid Transit Company, Ogden	10.09
Northeast Oklahoma Railway, Miami, Oklahoma	21.74
Dallas Railway & Terminal Company	1.81
Eastern Texas Electric Company, Beaumont	14.89
El Paso Electric Company	6.56
Houston Electric Company	1.50
Texarkana Street Railway	5.41
Texas Electric Railway, Dallas	3.03
Pacific Electric Railway, Los Angeles	2.14
Yakima Valley Transportation Company	4.68
British Columbia Electric Railway, Vancouver	0.46
Hamilton Street Railway	7.46
Montreal & Southern Counties Railway, St. Lambert	0.0
Montreal Tramways	5.85
Nova Scotia Power & Light Company, Halifax	25.20
Niagara, St. Catherines & Toronto Railway	1.81
Quebec Railway, Light, Heat & Power Company	0.46
Sherbrooke Railway & Power Company	11.22
Toronto Transportation Commission	6.81
Winnipeg Electric Company	1.69

Boston Railway, 0.621; the Texas Electric Railway, 0.631, and the Houston Electric Company, 0.631. In this list are found railroads of widely differing types, including city, interurban and rapid transit. Among large systems operating in the low ratio class are the United Railways & Electric Company of Baltimore, 0.678; the Long Island Railroad, 0.671, and the Philadelphia Rapid Transit Company, 0.691. Here again is a wide variance in class of service.

Traffic Increase on Many Properties

That traffic increased on many electric railways is indicated by figures collected by the American Electric Railway Association for the past five years. From these it is found that there were increases in passenger traffic on 77 properties last year. Some few of these are not representative, since they are due in whole or in part to inclusion of additional lines purchased, or for other reasons have been excluded from consideration. The remaining companies are listed in Table IV, together with the per cent increase in traffic of 1929 over 1928. The gains range all the way from 0.02 to 74.55. As in the other figures, the gains are distributed over the small, medium and large properties. Some of the largest increases in traffic are on small systems. This indicates that the need for transportation, even in communities of minor importance, has not disappeared, and that there is an opportunity for improvement in small city systems and on certain of the interurban lines.

Private Car Converted for Parlor-Buffet Service

FOR the use of parties on chartered trips a private car of the Terre Haute, Indianapolis & Eastern Traction Company has been converted into a luxurious parlor-buffet car. Built several years ago, this car was recently rehabilitated in the company's shops and furnished with new draperies, linen and tableware. A large lounging compartment, library nook and front and rear observation platforms provide accommodations for 25 passengers. Large windows of circular glass reaching almost to the floor afford a clear view from both front and rear platform. In addition to leather upholstered easy chairs, the car is furnished with a long center table, folding card tables and several commodious divans. A small galley and pantry, containing an alcohol range, refrigerator, cupboard and serving table, is located at the center of the car, as is a lavatory. The car may be chartered for trips to any point on the T. H. I. & E. system or connecting electric lines for a minimum of 25 full fares. A porter is assigned to the car to prepare refreshments and attend to the needs of the passengers. The car is motorized and is operated as a single unit under ordinary circumstances. Illustrated circulars are mailed to those who contemplate chartering the parlor-buffet car for private parties. If a party numbering more than 25 has to be accommodated, a trailer is attached to the car, or the car is attached to a regular train if the service permits.



Attractive interior of converted parlor-buffet car of the Terre Haute, Indianapolis & Eastern Traction Company

Trends in Material Purchasing *Analyzed*

Survey shows that the inventory value of materials and supplies kept on hand by the electric railway industry totals approximately $72,500,000, representing 1.2 per cent of company valuation and 5.6 per cent of annual gross receipts. Total annual expenditures amount to $181,500,000. Railways buying small lots more frequently. Speed of delivery and standardization important factors.

THROUGH their purchasing and stores departments the electric railways of the United States and Canada carry on one of the largest merchandising and industrial operations in America. In the course of a year these departments spend millions of dollars in the markets for materials, supplies and equipment with which to maintain their properties and carry out needed improvements. They also accumulate and sell scrap materials to the value of many thousands of dollars, while the elimination of waste products and obsolete materials runs, in the course of a year, into high figures.

Through a survey made by the JOURNAL, covering 42 electric railways, representing 21,755 passenger cars and 10,118 miles of track, it has been determined that the average total stores inventory for the entire industry is approximately $72,500,000. This investigation further showed that there is a complete turnover of stores materials slightly over 2½ times per year, which indicates that the total amount spent in the course of twelve months is $181,500,000.

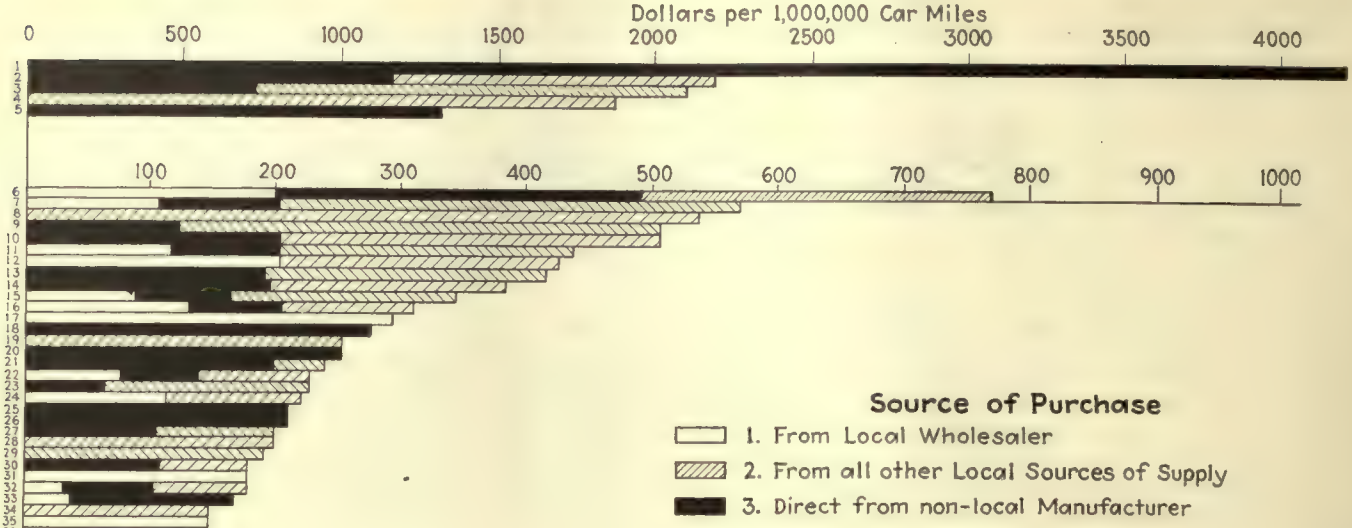
This figure checks closely with the data obtained from the electric railways for the record of expenditures, published in the January Statistical and Progress Number. For 1929, the industry expended $100,535,000 for maintenance materials alone. Most of these materials, of course, are handled by the stores department. To this amount must be added a large proportion of the $81,890,000 for way and structures, new plant and equipment, smaller proportions of the new plant accounts for cars, buses and power equipment, which had a combined total of $53,580,000, and a large proportion of the $20,720,000 for bus operating supplies. Assuming that these budget figures, submitted at the end of each year by the electric railways, are an indication of the amounts spent by the purchases and stores departments, the expenditures for materials have remained at a high figure for a number of years and have actually shown an increase in the past two years. According to estimates for the current year, another increase will be shown.

Other information secured in the survey indicates that the number of items kept in stock on a property of average size is over 8,000 and the inventory value is $460,000. This amount represents 1.2 per cent of the total railway valuation and 5.6 per cent of the annual gross receipts. It was also found that companies are buying small lots more frequently rather than occasional large lots; that compared with 1925 a majority of the companies are buying smaller quantities and buying more frequently; that wherever an increase in speed of delivery has been effected the railways have been able to reduce their inventory; that certain of the companies have been able to reduce their stocks by company or industry standardization, and that many companies use the A.E.R.E.A. standards.

Summarized Inventory Data of 42 Electric Railways

	Number of Passenger Cars	Miles of Track	Number of Buses	Items in Stock	Inventory Value, in Dollars	Ratio of Inventory Value to Total Company Valuation, in Per Cent	Ratio of Inventory Value to Annual Gross Receipts, in Per Cent
14 large railways { total	14,670	6,872	1,847	216,184	13,166,000		
14 large railways { average	1,047	491	132	15,450	941,000	1.03	5.61
13 medium-sized railways { total	5,126	2,328	1,018	120,615	4,875,000		
13 medium-sized railways { average	394	179	78	9,280	375,000	1.15	5.37
15 small railways: { total	1,959	918	283	54,230	1,281,000		
15 small railways: { average	131	61	19	3,620	85,400	1.41	5.75
Total of 42 railways { total	21,755	10,118	3,148	341,029	19,322,000		
Total of 42 railways { average	518	241	75	8,120	460,000	1.20	5.60

Annual Purchases of Large Electric Railway System



THIS chart represents the annual purchases of a large city electric railway company expressed in dollars per million car-miles.

Each class of purchase has been summarized separately and given a rank on the chart according to its importance. The prices of all materials used are net to the operating company, and do not include discounts, transportation charges, taxes or labor. Each bar is divided according to the percentage of the total amount purchased from the following sources: (1) from local wholesalers, (2) from all other local sources of supply, and (3) direct from non-local manufacturers.

1. Rail
2. Ties
3. Special trackwork
4. Car wheels
5. Brake shoes
6. Switches, electric
7. Cable, miscellaneous
8. Cable, lead covered, underground
9. Coils, armature
10. Wire, trolley
11. Bearings, ball, roller, plain, bronze, journal
12. Lamps, Mazda
13. Paving blocks
14. Castings, malleable iron
15. Plates, joint
16. Conduit steel for all types of wiring, underground and lead cable, etc.
17. Lubricants
18. Paint, oil and Japan
19. Oxygen
20. Lathes
21. Compressors, air, and parts
22. Insulators, porcelain, wood, glass, etc.
23. Heaters, car and building
24. Poles, trolley
25. Brushes, carbon
26. Ears, trolley
27. Castings, gray iron
28. Welding rod
29. Fence, iron and steel
30. Welding apparatus
31. Hose, rubber, all types
32. Bolts, machine
33. Axles, armature and car
34. Bonds, rail
35. Cement, Portland, asphalt and Lumnite
36. Bolts, track
37. Circuit breakers
38. Trolley wheels
39. Sleeves, pole and wire
40. Acetylene
41. Waste wool
42. Jacks and parts
43. Tampers, track
44. Solder, string, wiping, lineman's and wire
45. Castings, cast iron
46. Coils, field
47. Lockers
48. Varnishes
49. Brushes, paint
50. Lead, white
51. Castings, steel
52. Treads, safety
53. Tanks, steel
54. Wire, rubber covered with braid
55. Bushings, miscellaneous for cars
56. Tin, sheet
57. Rattan seating
58. Welding material
59. Soap, hand and car washing
60. Pumps, sump, oil, suction, circulation, etc.
61. Castings, truck
62. Splicers, wire
63. Registers, fare
64. Tape, miscellaneous types
65. Fire extinguishers
66. Wheels, emery
67. Castings, brass
68. Change carriers
69. Machines, tabulating
70. Locks, door, switch, cabinet padlocks, etc.
71. Wire, miscellaneous
72. Rods, tie
73. Bolts, special
74. Turpentine
75. Saws
76. Stokers
77. Pins, coupling, dowel, trunnion, channel, insulator, etc.
78. Holders, brush
79. Lock washers
80. Bolts, miscellaneous
81. Tape, friction
82. Valves, air, rubber, safety, check, etc.
83. Clocks, time recording
84. Drill bits
85. Wire, resistance
86. Batteries, dry and storage
87. Turnstiles
88. Asbestos, packing, sheet, cement, board, etc.
89. Gaskets, leather, rubber, asbestos, etc.
90. Line breakers
91. Hose, rubber, fire, pressure and air
92. Cable, rubber covered
93. Waste, cotton
94. Oakite
95. Wire, copper
96. Steel, tool
97. Tubes, boiler
98. Shovels
99. Cement, rubber, asbestos, etc.
100. Unions, pipe
101. Weed destroyers
102. Bells, buzzers, gong, parts and equipment
103. Rope, trolley
104. Mica, white sheet
105. Buckets, galvanized iron
106. Curtain material
107. Insulation tape
108. Varnish remover
109. Relays, electric
110. Hoists, chain, air and parts
111. Armature parts
112. Poles, line
113. Meters and parts, voltmeters, ammeters, Economy meters, etc.
114. Brooms, switch, paving, wire and rattan
115. Files, rail, wood, rasp, saw, cross, etc.
116. Connectors, cable and wire
117. Chamois
118. Paint, oil
119. Castings, bronze
120. Cloth, emery
121. Torches and parts
122. Cross arms
123. Cleaners, squeegees, brushes, scrapers and miscellaneous preparations
124. Catchers, trolley
125. Castings, miscellaneous
126. Cans, iron
127. Chains, sash, brake, jack, etc.
128. Lightning arresters
129. Handles, small tool
130. Brass, cold rolled, hand drawn and channel
131. Cocks, miscellaneous
132. Headlights
133. Plates, miscellaneous
134. Reflectors, headlight
135. Insulation, mica, porcelain, asbestos, etc.
136. Tubing, resistance
137. Tubing, steel
138. Enamel
139. Belting, leather and rubber
140. Bolts, fork, etc.
141. Paint, roof
142. Ladders
143. Hammers, hand and pneumatic parts
144. Straps, hand
145. Punches, shop
146. Duplicators, typewriting
147. Disinfectants
148. Door control devices
149. Plates, steel
150. Plates, tie
151. Tubing, brass
152. Wire, flameproof
153. Phosphor bronze-spring temper, wrought and filler
154. Wire banding
155. Wire magnet

For the purpose of analyzing the data secured, the 42 companies were divided into three groups, their representation in each group being determined by the number of passenger cars, number of buses and miles of track. Group one, consisting of the larger properties, includes fourteen electric railways with 14,670 passenger cars, 6,872 miles of track and 1,847 buses. Group two consists of thirteen medium-sized railways, with 5,126 passenger cars, 2,348 miles of track and 1,018 buses. The third group has fifteen companies, with 1,959 passenger cars, 918 miles of track and 283 buses. In analyzing the various factors investigated, reference will be made to these three groups.

The returns showed an extremely wide variation in the number of items kept in stock. In the large group this figure varied from 3,500 to 45,000; for the small group, it ranged between 1,200 and 6,500. So many factors govern the number of parts it is necessary to keep in stock, however, that considerable variation is to be expected. Standards of maintenance, whether or not the company generates its own power, whether or not it operates buses, and the degree to which materials are standardized, all have an important bearing on this figure. Naturally the larger companies require many more items than the smaller ones. For the former the number of items in stock averaged 15,450; for the medium-size railways it averaged 9,280, and for the smaller companies the average was 3,620. For all 42 railways, the average number of items was 8,120.

Analysis of the inventory values of the railway shows the same wide variations that exist for the items in stock. For the larger companies the inventory value ranged between $2,500,000 and $375,000; for the smaller ones it varied between $216,000 and $16,000. Average inventory values were $941,000 for group one, $375,000 for group two, and $85,400 for group three. For all 42 companies the average inventory value was $460,000.

Although the number of items in stock and inventory values showed wide variations, the percentages of total company valuation and annual gross receipts, represented by the inventory value, were more nearly constant within the groups. In group two, for example, the percentages of total company valuation ranged between .7 and 1.85. The average inventory figures by groups, in per cent of total company valuation were 1.03 for group one, 1.15 for group two, 1.41 for group three and 1.20 for the complete list. The larger percentages for the smaller groups is explained by the necessity for keeping a certain fixed number of parts for the maintenance of equipment, regardless of how many vehicles are in operation.

In relation to the annual gross receipts the inventory values for the larger companies averaged 5.61 per cent. For the medium-size companies, the per cent was 5.37, for the smaller ones 5.75, and for all 42 companies 5.60. Although there were a few wide variations from the average figures for each group, most of the companies were in the range of from 5 to 6 per cent.

Buying Small Lots More Frequently

Almost every company indicated that it was buying its supplies more frequently and in smaller amounts. This was particularly true for supplies for the maintenance of cars and even more so for buses. Materials for track construction and maintenance, on the other hand, are bought less frequently according to the reports. Several railways stated that they buy spikes, rail and other track supplies only once a year. Most of the railways which indicated that they were buying smaller amounts, qualified their statement by mentioning factors which influenced the buying of larger quantities occasionally. It is apparent that few railways are buying small amounts unless they can get the same price as would be tendered them for a quantity purchase. In those cases where discounts or other price inducements for large purchases are not offered for small quantities, most of the companies buy the larger amounts. Probably the generally accepted rule used is that small orders are placed unless the savings in cost obtained by a quantity purchase exceed the interest on the money tied up.

Another important factor with regard to ordering is the source of supply and the resulting time of delivery. Most companies specified that where the supplies were secured from local sources or nearby cities smaller amounts were secured. Products obtained from manufacturers at distant points are ordered in larger quantities. Of course, local and market conditions, as well as emergencies, have an important bearing on the amount and frequency of the buying. Only one company expressed itself in favor of large orders as a general principle. This company stated that it orders its supplies to last six months, to eliminate the added expense, mistakes and "red tape" of frequent ordering.

Compared with 1925 almost all of the companies are ordering smaller quantities and more frequently. Several of those who stated that there was no difference in their ordering of 1925 and 1929 added that they have been buying in as small quantities as possible for several years.

Speed of Delivery Reduces Inventory

That the increased speed of delivery has been an important contributing factor in reducing the inventories of many railways was affirmed by the majority of answers received. Although one or two stated very emphatically that speed of delivery had assisted in reducing their inventories, the majority indicated that it was a contributing but not a major factor.

The greatest factor in reducing stock has been standardization by both company and industry. On those properties which have made real attempts to standardize their materials, very substantial reductions have been obtained. Some of the reductions reported were 50 per cent, 40 per cent, 20 per cent and 18.4 per cent. One company said that it had reduced its stock from $3,096,000 in 1924 to $2,040,000 at the end of 1929. Still another reported a decrease from $1,250,000 in 1926 to $750,000 in 1929. A few companies mentioned that it was impossible for them to reduce their stock because of the frequent changes in equipment.

Standards of the American Electric Railway Engineering Association are used wherever possible on a majority of the properties which replied. Three stated that they did not use these standards to any great extent and one mentioned that they were used only for scrap sorting, but all the others indicated that they were using them wherever possible or practicable.

Two companies indicated that they were using the A.E.R.E.A. standards almost 100 per cent. In the case of one company, they are used 10 per cent for maintenance of way, 80 per cent for electrical parts and 15 per cent for mechanical parts. In general, the majority of companies are adopting the standards wherever possible, and there is a decided move in favor of their general adoption.



One of the four-track catenary and signal bridges. The old banjo signals seen on the mast near the left of the bridge will be removed and replaced by color light signals of the type shown supported from the bridge

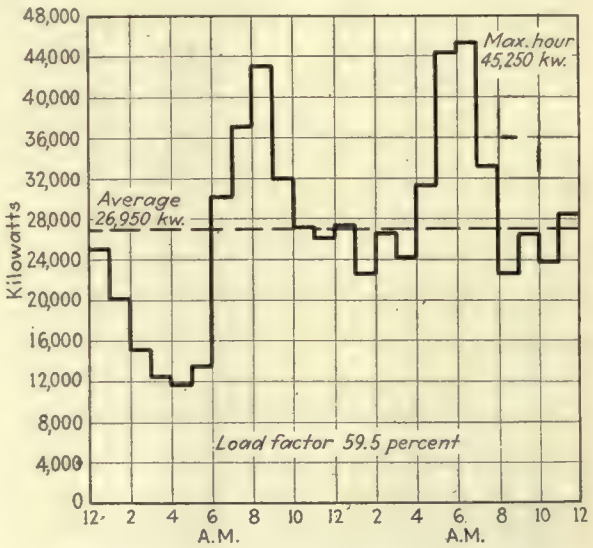
Reading Company's

Philadelphia Suburban

PROGRESS on the work of electrifying the lines of the Reading Railroad in the vicinity of Philadelphia is approximately up to schedule. It is expected to start operation a year from this spring or early summer. Ground was broken for the first of the catenary foundations June 18 of last year, and at present a force of 40 engineers and draftsmen is engaged in the design and about 650 men are on the outside construction, exclusive of work that is being contracted for.

The first stage in the electrification of the Reading was authorized by the board of directors on Oct. 25, 1928. Only preliminary work had been done prior to that date. Inasmuch as this is the first electrification work the company has done, it was necessary to develop all standards, plans, specifications, methods of procedure, etc., from the beginning, and to organize a force for this purpose. This of necessity has consumed some time.

The map shows the territory being electrified. The initial electrification extends from Reading Terminal to Lansdale on the Bethlehem branch, to Langhorne on the New York branch, to Hatboro, and to Chestnut Hill. It consists of 50 route-miles and 110 track-miles, and covers the most important of the suburban services. The suburban electrification may be extended to Norristown, Doylestown and Trenton, and when the through freight and passenger services are electrified, would be extended to Bethlehem, Bound Brook, and possibly Reading and Pottsville.



Typical power load curve after complete electrification of the Philadelphia district

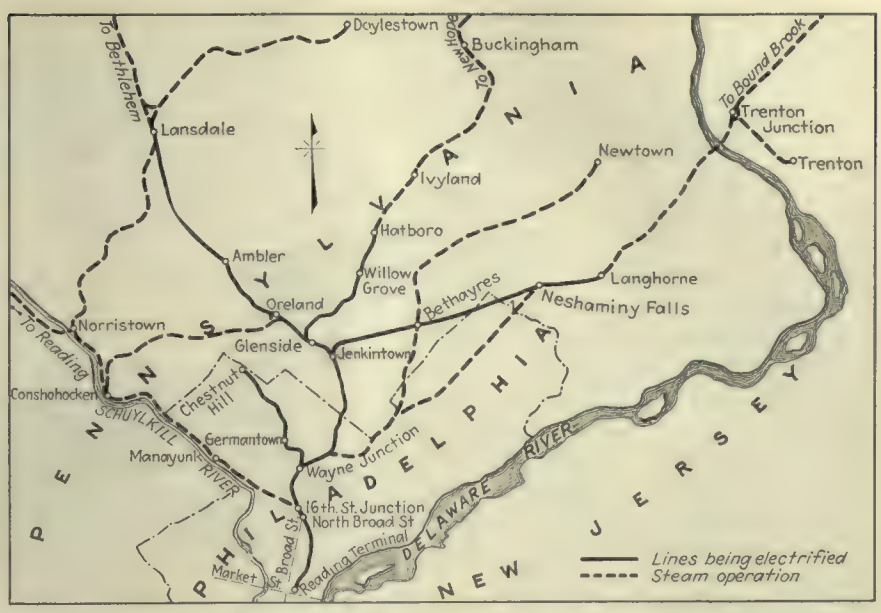
A contract for power has been entered into with the Philadelphia Electric Company for 25-cycle, 13,200-volt alternating current to be supplied at Wayne Junction, 5 miles from Reading Terminal. This contract is for a term of twenty years, which allows the power company to amortize the investment in equipment installed for the railroad. Initially, the power is billed at established rates for railroad loads in this territory. When the railroad demand reaches a definite amount, the rates are based on the actual cost of

Electrification

Making Rapid Progress

Heavy suburban service will be given by 11,000-volt single-phase motor car trains on the initial section of the Reading's electric system. It is planned to extend the road later and to include main line freight and passenger service

By
G. I. WRIGHT
Engineer of Electric Traction, Reading Company
Philadelphia, Pa.



Electric service in the Philadelphia district will be given first on the suburban lines out of the Reading terminal. It will later be extended to cover the main-line trains

power to the power company, including both operating and fixed charges. This will result in a very reasonable cost of power and will enable the railroad to share in the economies which the power companies have made and surely will continue to make in generation, transmission and distribution.

A load curve for the future suburban, through freight and through passenger load in the general Philadelphia area is reproduced. This shows a maximum hour demand of 45,250 kw. and a load factor of 59.5 per cent.

The importance of a favorable power rate, and one that is made more favorable by increasing loads as well as increasing load factor, is apparent when it is seen that the Reading Company's power bill, after through electrification for the Philadelphia territory, will be around $1,500,000 per year.

To furnish this power the Philadelphia Electric Company will run underground, 13,200-volt, 60-cycle lines from Westmoreland substation to Wayne Junction, and at the latter point erect a frequency changer station. Two 15,000-kw. motor-generator sets will be installed initially, while the station will have an ultimate capacity of six such sets. Power will be delivered to the railroad substation bus at its Wayne Junction substation.

The three-wire system, with 36,000-volt transmission will be used in the suburban zone. This system with a lower transmission voltage is used on the New Haven, and in a modified form on the Virginian electrification. It has also been successfully used in Sweden.

The substations consist of auto-transformers connected between the 36-kv. transmission wires and the trolley wire with the one-third point connected to the rails.

Due to the number of stub lines with consequent frequent substations and the narrow restricted rights-of-way this system is particularly economical in first cost. It is also advantageous from the standpoint of minimizing inductive interference in communication lines.

For extensions to Bethlehem, New York, etc., 66,000-volt, single-phase transmission lines will be used. Due to the Central Railroad of New Jersey's having a very heavy suburban service, a source of power for the New York end is considered a necessity.

The zone initally being electrified has an exceptional number of interlockings and junction points. There are nine interlocking plants in the first 10 miles of railroad between Reading Terminal and Jenkintown. All contact wires are sectionalized at these points and this results in complicated catenary wiring and the necessity for a large number of trolley circuit breakers.

In the event of trouble or faults in the catenary system, these being much more frequent than in a power company's distribution system, selective action of the circuit breakers is necessary. Several new schemes of obtaining selectivity have been studied and actually tested out, with small proportional currents in a network set up to duplicate the railroad's distribution system.

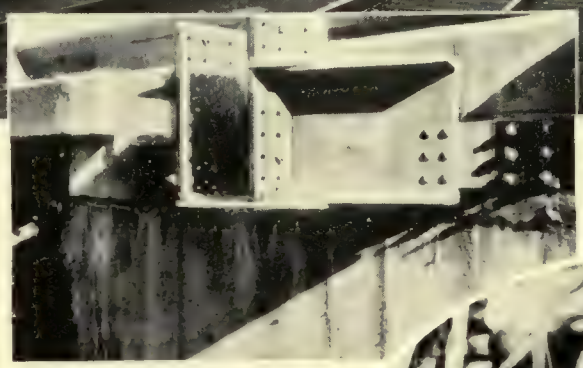
Supervisory control will be used to operate all circuit breakers and sectionalizing disconnects between substations.

Two Types of Catenary Structures

The catenary and transmission structures are of two general types. A fabricated truss supported by H columns is used in the four- and five-track territory be-



Catenary bridge with central supporting member, showing also the new signal installation



The space for installing supporting bridges is so restricted that in some places they had to be placed on the outside of the retaining wall

tween Reading Terminal and Wayne Junction. Here the restricted right-of-way and proximity of buildings along either side of the railroad makes necessary carrying the transmission wires on masts mounted on the truss. Due to the frequent interlockings, there are many signal bridges in this territory and the catenary bridges are designed to accommodate the new signals which are hung from the trusses. These bridges are fitted with ladders, walkways and cages for signal maintenance, all the old signal bridges are being removed.

North of Wayne Junction the H columns are run up to carry the transmission wires and H section crossbeams instead of trusses are used. Copper-bearing steel is used for all the lighter steel members as an additional protection against corrosion. No transverse guys are used but longitudinal guys for dead ends and at wire crossings. Considerable pains have been taken in the structure and catenary design to standardize as much as possible, keeping the number of types of structures, fittings, etc., to a minimum.

Foundations are all designed with anchor bolts and both gravity and side-bearing designs are used. An unusually large number of special foundations were necessary on account of interferences and restricted right-of-way. Some of these are shown in accompanying illustrations.

Two different types of inclined catenary are being installed. The first is the conventional type in which a bronze trolley wire is supported from an auxiliary copper messenger, which in turn is supported by a bronze main messenger, using three wires in all, and 300-ft. spans. This is being used between Reading Terminal and Langhorne. The second type has only two wires, a bronze trolley wire being supported from a composite



Another unusual location for a catenary bridge foundation. The proximity to the running rail at the left shows the limited space available for the construction

copper and bronze messenger cable with 250-ft. spans. It is to be installed between Jenkintown and Lansdale, and on the Hatboro and Chestnut Hill branches. This type is simpler, lighter and less expensive and the structures can be somewhat less expensive also. We will thus have a comparison of these two types to use in making decisions for further electrification work. It is felt, however, that the latter type of catenary will give entirely satisfactory results, particularly with the method by which we plan to collect the current.

New 11,000 Train Bus Line Connectors Developed

Two pantographs will be in contact with the wire at all times and connected together electrically on the car or locomotive. At least one of these pantographs will be sure always to be in contact with the wires, and as they are in parallel this should minimize if not eliminate sparking.



Connectors between cars couple the 11,000-volt train bus lines automatically. This device was designed and developed by the Reading engineers. The cover at the left is removed to show the construction

With this method, on a ten-car multiple-unit train only two pantographs would be in operation, instead of all ten as in the ordinary scheme where every motor car is independent of all others. This should result in materially less trolley wire and pantograph shoe wear, also less damage to wires and pantographs in the event of a pantograph fouling the wire system, a not infrequent occurrence.

However, the use of such a system for our trains necessitates an 11,000-volt bus line run along the tops of the cars and a means of connection between the cars which is automatic in its operation. Such a connector was not available and the manufacturing companies were requested to develop one. The designs proposed were not considered adequate or satisfactory, so we undertook to design such a device. This has been done and a bus line connector has been built and operated successfully on two steam cars for the last three months. This connector, shown in one of the illustrations, will be used on the new cars.

While this method of operation has not been used in this country, the use of two pantographs bussed together on locomotives is common practice in Europe and results obtained were carefully checked with operating and maintenance people abroad.

Lightweight Cars Will Be Used

While there will be nothing radical about the new cars, they will incorporate many refinements and improvements and will show considerable weight reduction over most existing cars of their size. All will be motor cars and will seat 86 passengers, and each will be equipped with two single-phase commutating motors of 250 hp.

There has been great activity in the alternating-current single-phase traction motor field within the last few years. We now have six single-phase motor-car motors to choose from, where a few years ago there were only one or two. It is expected that the latest types will show superior performance and maintenance. Even greater activity in locomotive motor design has taken place and is taking place in anticipation of the Pennsylvania requirements, and the Reading will fortunately be able to profit by this when it buys locomotives.

There has fortunately been time to give considerable thought to the layout and equipment on the cars. This has resulted in reducing the amount of conduit, wire, and air piping to what seems to be an irreducible minimum. The layout has been made such as to be most accessible for inspection and maintenance. Improvements have also been made in the ventilating apparatus and ducts, and a new system, designed by the railroad, of filtering snow and dirt from the ventilating air is to be used.

Motors have been so arranged that they can be removed from the trucks without removing the truck from under the car and the car body can be lifted from the trucks without disconnecting ventilating connections. A new design of truck has been tested out for several months on one of our steam cars in regular service and may be used on the new cars.

The high cost of heating electric trains is not generally



Pouring concrete for a signal bridge foundation under difficulties. By the use of a concrete train no space for installing mixing machinery was needed

realized. The energy for this purpose during the heating season amounts on different roads to from 20 per cent to as much as 40 per cent of the total energy used. To reduce this to a minimum, consistent with comfort to the passengers, a double thermostat control will be used, a 70-deg. thermostat being used only during the time the engineman is in the cab and a 50-deg. thermostat at all other times. Also provision is made whereby the engineman can change from the high to the low thermostat for all cars in the train when approaching a terminal to economize on the heat.

A new automatic door-closing device will be used which automatically closes all end doors in the train as soon as the train starts after the station stop. This, in addition to having heat, will avoid drafts due to doors being left open until they are closed by the trainmen.

Shop Facilities at Wayne Junction

To handle the inspection and repair of the cars and future locomotives, and to store them during the day when not in use, a new car shop and storage yard is nearing completion at Wayne Junction. The shop has five tracks, three for inspection, two for repairs. It is 320 ft. long and can be extended to twice its present length for future requirements. This shop is being pushed to completion for use as a construction storehouse and headquarters for the overhead construction, as it is strategically located for this purpose.

Adjacent to the shop will be the frequency changer substation, the Wayne Junction transformer substation, linemen's maintenance headquarters, and the load dispatchers' office, which will make this location the electrification headquarters. This should make a compact and efficient operating arrangement.

Lastly, the large amount of work in preparing the railroad for electrification should be touched on. Additional clearance has to be provided where required for the overhead wires; grade crossings are to be eliminated; direct current signaling has to be changed over to alternating current; underground conduit has to be installed; telephone wires have to be put in cable and in some localities underground; foreign wire crossings rearranged and eliminated; new storage yards built, and many other changes made. Cost of this work in our case will be approximately equal to that of the electrification proper, including the new cars. Later will come training of the present personnel to operate and maintain the equipment.

All engineering work for the electrification is being done by the Reading Company; also all construction work, except buildings, is being done by railroad construction forces organized for this purpose.

Care Essential in Stringing Trolley Wire

Expansion and contraction with temperature must be taken into account if lines are to be kept tight and breaks prevented

By **J. F. NEILD**

Electrical Engineer, Toronto Transportation Commission

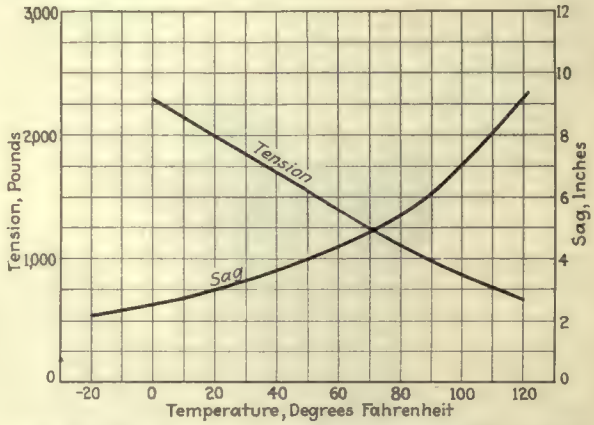
IN THESE days of rapid street car service operated on close headways, the trolley wire demands serious consideration, first as to kind and second as to method of erection. The kind of wire depends on such physical conditions as grades, curves, etc., and on such operating conditions as the amount of energy required for the starting and acceleration of the rolling stock, the frequency of stops, etc. The materials available for practical purposes range from hard-drawn copper trolley wire, which is suitable for long tangent routes having infrequent service, to high-strength low-conductivity bronze trolley wire backed up by heavy feeder capacity for close headway trains, curves, loops, etc.

This part of the subject has been fairly well covered in technical journals and manufacturers' advertising matter and information is easily obtained.

The erection of the wire is just as important as the use of the proper kind of wire. The greatest care must be exercised to avoid any nicks, cuts or scratches, as these materially affect the life of the wire.

The trolley wire should be as nearly parallel to the track as it is physically possible to make it, depending on a not too rigid cross-span for flexibility. It is in trying to erect the overhead structure in such a manner as to obtain this condition that one meets problems.

For instance, 1 mile of unstressed copper trolley wire will contract in length approximately 4½ ft. for a decrease in temperature of 100 deg. F. Consequently, if the trolley wire is strung too tightly at high summer



Tensions and sags for stringing 00 hard-drawn copper trolley wire at various temperatures, 100-ft. span

temperatures it will probably snap at the slightest provocation under sub-zero conditions. At the same time, to obtain the maximum life from the trolley wire, it is advisable to keep the sag as small as possible.

In Toronto, which has a climate similar to that of other Northern cities, temperature variations have been recorded during the period of electric railway operation from 20 deg. F. below zero to 104 deg. F. above zero. Trolley wire must be strung so that it will not fail at the extremes of this range. The tension and sag curves at various temperatures in the accompanying illustration have been computed for our own conditions; that is, so



Measuring the trolley wire tension with a dynamometer

that the maximum stress at 20 deg. F. below zero with a loading of ½ in. of ice and 8 lb. per sq.in. wind pressure, will not exceed half the ultimate strength of the wire. The fact that all of these maximum conditions are not apt to occur at the same time simply adds another factor of safety to the calculation.

On any other property it would appear that to obtain the maximum wear from the trolley wire it would be advisable to derive the relation between temperatures and tensions to conform exactly with normal expected weather conditions. Bronze trolley wire, of course, may be strung at greater tensions than the hard-drawn copper wire on account of its higher ultimate strength.

A dynamometer inserted between the trolley wire clamp and the blocks in pulling up the trolley wire gives a direct measurement of the tension. The measurement of sag, when made accurately with a level and corrected for exact length of span, is a good check on tension of trolley wire already in place. It is not accurate enough to measure the sag from the rail, as an almost imperceptible grade in the track is enough to throw the results out considerably.

At the present time the problem of the correct tension of trolley wire and span wire for varying conditions is being taken up in study by a special committee of the Power Division of the American Electric Railway Engineering Association with the idea of establishing a set of tables and curves that will cover more generally the different variable factors.

In Toronto, during the past few years, we have replaced as much trolley wire as possible in the cold weather while the wire is near its maximum contraction. As a result the wire is rarely called upon to exceed its original stringing tension.

I have not given any data as to the broken trolley wires per year on this system. Information on this subject appeared in the issue of ELECTRIC RAILWAY JOURNAL for January, 1930, page 48. The results indicate that, even under the severe conditions encountered in Toronto, little difficulty has been experienced with trolley wire breaks.

Thawing Frozen Water and Conduit Pipes

By H. A. BROWN

Foreman Return Circuit, Switch and Signal Division
Cleveland Railway

FREQUENTLY during the winter months. it is necessary to thaw out frozen water or conduit pipes. To do this work quickly and efficiently the Cleveland Railway often uses the regular rail joint bonding equipment. This unit consists of a 600-volt rotary converter and a transformer which provides 1,500 amp. at 12 volts potential across the two secondary leads, each of which is about 20 ft. long. The leads are connected to the ends of the frozen section of pipe or conduit and the current applied for about one minute. This is usually sufficient to thaw out the frozen pipe. The use of the bonding device for this purpose has saved a great amount of time and sometimes has saved a complete pipe renewal.



Checking up on tension of the trolley wire by measurement of the sag with a level



Preferential

Traffic Rights

for Street Cars

Mass transportation must be expedited. Many plans for relief of congestion are merely palliatives. Parking should be radically restricted or abolished on important thoroughfares. Dominant consideration must be given to the major movement

By

WINTHROP M. DANIELS

Professor of Transportation
Yale University

RAPID multiplication of motor vehicles has profoundly influenced both the street railways and the steam railroads. This new agency of transportation has made itself felt both in the competition it has offered in the field of passenger traffic and in the way it has affected the business of operation.

It is a commonplace to say that the private automobile has cut heavily into the passenger traffic of both the steam railroad and the street railway, and that the motor truck—in a lesser degree—has taken over some part of the short distance merchandise traffic of the steam railroads. The decline in the passenger revenue of the steam roads since 1923 has been not far from 10 per cent, and the reduction in passenger-miles about the same, the commutation traffic showing, however, an increase of about 10 per cent, with the shrinkage coming in regular passenger service where the average journey has increased from 54.6 miles in 1922 to 73.2 miles in 1928.

The decline in street railway and associated bus traffic is computed by the ELECTRIC RAILWAY JOURNAL to have been from 116 to 101 revenue rides per capita from 1902 through 1929, but riding patronage for the past few years has been about constant. This is the more encouraging from the fact that the registration of automobiles has in the same period been constantly rising. The gross passenger receipts of the street railways, unlike those of steam railroads for passenger service, have for the past four or five years shown a decided increase, those for 1929 being the greatest in their history. This is largely due to the increase in the individual fare which on the average has risen from the old nickel fare to about 8 cents.

From these rather bald facts several inferences may be drawn as to the influence of private motor car competition upon the two related industries. The menace to the street railways was immeasurably the greater. Passenger traffic is overwhelmingly their main source of revenue, whereas with the steam roads it contributes only one-fifth as much revenue as freight. In numerous cases the steam roads, by substituting gas-electric or motor-bus operation for regular passenger service over lines of sparse traffic, have actually saved by the lower cost of operation, whereas the diversion of trolley traffic to the private automobile is practically a dead loss to the street railway.

Nor do the street railways have much collateral compensation for this loss of traffic, whereas the steam railroads from the transportation of automobiles, auto trucks, auto parts and tires alone derived almost 5 per cent of their carload freight revenue in 1928. Petroleum oils, refined and other gasolines yielded more than as much again, and if road-building material be added, it can be seen that the steam railroads have had a handsome offset in increased freight tonnage and revenue to the not incon-

siderable shrinkage in their gross passenger revenue.

It ought, of course, to be added that the steam railroads have lost some of their short distance freight traffic to the motor trucks. But there are two considerations that diminish the importance of this factor. The first is the railroads' own adoption of the motor truck where it can be run to advantage, particularly in cutting down the daily number of way freight trains formerly operated. The second is that short-distance, less-than-carload merchandise traffic is commonly understood to yield very thin net revenue. So that the abatement to be made in the railroads' gain of tonnage and revenue, directly and indirectly traceable to the motor vehicle, is not of overwhelming significance.

The multiplication of the private automobile has relegated both the steam railroad coach and the street railway car to a wholly secondary place, if measured in the relative number of passenger-miles covered collectively by each type of vehicle annually. It has drawn from the rails much traffic that will never be regained. It has, however, created a much vaster amount of traffic than it ever attracted away from the railroads or the railways. But it has been demonstrated that there is a core of passenger traffic the automobile is powerless to absorb. It can never absorb long-distance high-speed passenger traffic. It can never absorb commutation traffic nor the mass movement of city traffic in commission hours.

There is still a no man's land where the competitive rivalry is acute — where it remains to be seen whether the railroads and street railways, both supplemented by their own automotive adjuncts of trucks and buses, can coax back to themselves and away from the private automobile and the private truck, the marginal traffic which for the moment can be handled by either.

In the matter of operation, the millions of private motor cars and trucks have created problems of an entirely different character for the steam roads and the electric railways. The former operate, of course, upon their own right-of-way, whereas the electric railway and the thousands of buses operated as extensions use the city streets and the public highways. Upon an exclusive right-of-way, the physical obstacles from motor vehicle operation are at a minimum. To this almost the only exception is at grade crossings where the many fatalities create a serious situation, and intensify the demand for more complete crossing protection or even the still more expensive separation of grades. But apart from this situation, it may fairly be said that the problem of physical operation of steam railroads has not been seriously complicated by motor vehicle operation.

Indeed, in some respects motor truck operation has been of direct advantage to the steam roads, particularly in their interchange of merchandise freight in large terminals. Of course, so far as railroads use the motor truck or motor bus as adjuncts, these vehicles encounter the same operating difficulties on the streets as confront the motor vehicle generally; and this field is one which in large centers is growing rapidly. The Pennsylvania Railroad only recently filed a schedule according free passenger transfer by bus to parties of 25 to points within Manhattan, the Bronx, Brooklyn and Newark where their tickets apply to or from designated territories upon that carrier's lines. But apart from this railroad use of buses and trucks, and from crossings at grade, the multiplication of motor traffic has not created serious operating problems for steam railroads.

While the motor vehicle disturbed in only a minor degree the physical operation of the steam railroad, it may be said to have almost disrupted the operation of street railways. The arteries of local street traffic in central shopping and business centers are suffering from high blood pressure; they are ordinarily congested, and not infrequently are wholly clogged. The ability of surface car lines to maintain the headways requisite for mass transportation morning and night has been threatened or impaired. The prospective dispersion of the car-riding public has also created bewilderment as to the permanency of routes to be operated. The dilemma has grown until it involves not the operation of the surface lines alone but the far wider problem of city planning in general.

The root of the difficulty lies, of course, in the fact that the area of our paved thoroughfares was a century ago designed to accommodate the horse-drawn traffic of that time. We are now engaged in the almost hopeless effort of trying to force a 3-in. stream through a ½-in. nozzle. And as if the job were not difficult enough, we have accentuated it by diminishing the already inadequate roadways by the practice of parking. The difficulty is intensified by the rapidly increasing number of motor vehicles. Plant an overplus of seeds in a garden patch and they will choke and kill each other just as surely as would so many weeds.

There have been devised numerous remedies which in different places operate with a differing degree of success. But they all suffer from one of two defects—either they are mere palliatives, or else they involve such vast expense that they can seldom be practically used. Among the palliatives—helpful in themselves, but incapable of affecting a radical cure—are: (1) abolishing the left hand turn; (2) restricting the narrower streets to one-way traffic; (3) staggering opening and closing hours of business houses and theaters; (4) confining heavy trucking of coal or garbage and refuse to night or early morning hours; (5) improving the operation of traffic light signals so as to speed and not to obstruct traffic; (6)

Editor's Note

PROBLEMS of transportation have long been familiar to Professor Daniels. For many years he was professor of political economy at Princeton University. From 1911 to 1914 he was a member of the Board of Public Utility Commissioners of New Jersey, and from 1914 to 1923 a member of the Interstate Commerce Commission, serving as its chairman for two years. Since 1923 he has been professor of transportation at Yale. The accompanying discussion of present-day problems of urban transportation is based on a talk made by Professor Daniels at a recent meeting of the New England Street Railway Club.

providing by-pass streets for traffic which has no need to occupy main thoroughfares; (7) the skip-stop plan for the trolley cars; (8) the boulevard-stop plan; (9) uniform traffic codes such as prescribing whether turns on the red light may be made without stopping, or only after stopping, or not at all; (10) requiring loading and unloading platforms for stores to be constructed within building lines and not projecting upon the sidewalk; (11) provision by the city, by private garages or by business houses (for their customers) of parking spaces off the streets; (12) limited parking (generally ineffectual and unenforcible); (13) prohibition of parking, or at least its restriction to non-congested areas. This baker's dozen of remedies, however, are merely palliatives. "Anti-Fat" is no remedy for the dropsy.

Then there come the more ambitious remedies such as street widening, double-decked streets, arcaded sidewalks, city-zoning with a limitation on the height of buildings abutting on the streets, over-passes at the junctions of crowded motor traffic lanes, underground escalators for pedestrians, and finally subways costing millions of dollars a mile. It is tolerably safe to say that except in the largest and densest urban centers these remedies will involve prohibitive expense.

Where, amid this jumble of ill-assorted plans, does the future operation of street railways come in, and along what lines does their hopeful future lie? As one wholly inexpert in street railway operation I would venture the following suggestions: First, they must put in a claim, not only in their own interest, but equally in the interest of the car-riding public, that in congested urban sections during commission hours they must be given a preferential use of streets and public thoroughfares. When it is remembered that a car with 60 passengers takes perhaps one-twentieth of the street area necessary for the accommodation of 20 or 25 private automobiles with the same number of riders, a strong argument can be made for such preferential right-of-way as may be necessary to expedite the mass movement of the riding public for definite periods both morning and night. Parking on such thoroughfares should be radically restricted or abolished. "The essence of the public easement in the highways is passage. Parking is the antithesis of passage," says one of our legal lights; and "Storage on the highways is trespass" on the abutting owner, and a common nuisance to the public. The inconvenience of the few ought to give way to the convenience of the many, and dominant consideration should be shown to the major movement.

This result will not be attained until a campaign of education has taught the merchant that parking before his door is not only an injustice to the public, but is dispersing his own customers to more accessible local sub-centers, and is opposed to his own long-run interests. Once the merchant is convinced, the road-hog and the curb-hog can be taken into camp.

It is also to be noticed that the very inertia which opposes any thorough remedy for street congestion is, in a way, self-corrective. The growth of sub-centers for independent shops and branch stores and even for banks, and the rapid migration of business away from the narrower streets to the wider avenues and thoroughfares should warn the standpatters that they are standing in their own light.

There can be little question that the present tendency is to contract rail mileage and to expand bus-route mileage. Figures can be given to show that bus-route mileage is already 50 per cent of street railway track mileage, and the passenger mileage by bus is a growing percentage of total passenger-miles. Absolutely and relatively, track mileage is on the decline. Last year witnessed a net shrinkage of track amounting to more than 1,000 miles. It has yet to be shown that the bus can ever wholly supersede the car on rails in city transportation.

One final suggestion is ventured. Is it too much to expect that the vehicle designer will contribute to the preservation and even the popularization of the riding habit, both by car and by bus? In some ways, the typical street car is an efficient instrument, but in the same way that a military tank or an armored car is an efficient instrument. It has about the same life as a railroad box car. It can and does stand up under heavy usage. Both the car and the efficient braking apparatus make notably for safe operation. Much of the older equipment, however, is unattractive. Access by steep steps, through narrow platform entrances, limited ventilation, and often a single difficult exit are not calculated to allure traffic. The street railway buses seem to have improved upon the car in these respects, and more particularly in the seats. The bus, however, has a life of only five to six years, and its upkeep and retirement costs must be high. It lacks the staunchness which is the street car's basic merit. But the lure of line, style and color, convenience and design cannot be permanently neglected if the electric street car is to maintain the popularity its utility deserves.

"Bus Transportation" Offers Awards

IN AN effort to stimulate further improvement in motor bus operating methods and practices among the motor carriers in the United States and Canada, *Bus Transportation* has set up six awards for the most outstanding examples of progress made in maintenance practices and methods.

The six awards are divided among three different classes of companies:

(a) Those companies operating 3,500,000 or more bus-miles annually in revenue service; (b) Those companies operating 1,000,000 and less than 3,500,000 bus-miles; (c) Those companies operating less than 1,000,000 bus-miles annually in revenue service.

For the most outstanding example of progress made in maintenance practices and methods to date by any carrier in each of the three classes mentioned, a medal plaque and a certificate of award to the carrier, and in addition $500 in cash to be employed in any manner it elects. For the second most outstanding system of maintenance practices and methods, honorable mention will be given in the shape of a certificate of award, and a medal plaque. All awards will be based on (1) the record of results achieved, and (2) the explanation of the maintenance practices and methods employed.

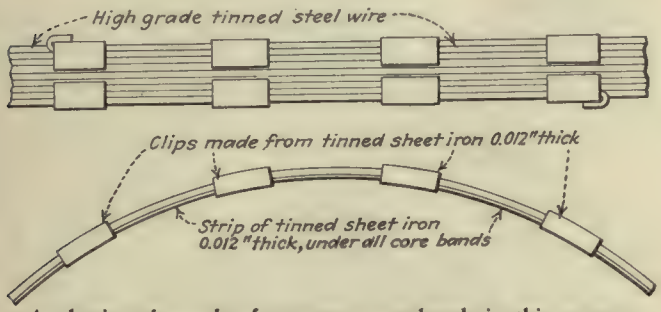
The committee of awards consists of the following: Arthur M. Hill, president National Association of Motor Bus Operators, chairman; E. P. Warner, president Society of Automotive Engineers; Charles Gordon, managing director, American Electric Railway Association; Carl W. Stocks, editor *Bus Transportation;* P. J. Neff, chairman Motor Coach Section, Motor Transport Division, American Railway Association.

The awards will be announced at the annual convention of the National Association of Motor Bus Operators, to be held in Chicago, Sept. 18 and 19, 1930.

Anchoring Armature Core Bands

By J. S. Dean
Westinghouse Electric & Manufacturing Company

BY ANCHORING the ends of core bands on railway armatures, which are subject to severe mechanical strain due to centrifugal force when the armature is rotating at high speed, the service life of these bands can be materially lengthened. The bands should be wound in place on the core, using a high-grade tinned-steel wire having an ultimate tensile strength of 200,000 lb. per square inch. Preferably a 14 B&S gage wire should be used and wound at a tension ranging from 200 to 250 lb. Under the core bands a strip of 0.012-in. tinned sheet steel extending the entire way around the armature should be installed. If these methods are followed it is not necessary to use tinned strips on the end bands over the extension of the coils, at both the front and the rear ends of the windings.



Anchoring the ends of armature core bands in this manner gives longer life under service operating conditions

Clips of 0.012-in. tinned sheet steel should be equally spaced (about every third or fourth slot) around the armature. These should be placed under the steel strip over the coils and not on top of the teeth.

At the start and finish of the band wire four of these clips should be placed about 1 to 1½ in. apart, to hold the ends securely. The ends of the wire should be anchored by bending them at the start and finish around the tinned clips for about ¼ in., as shown in the sketch.

While ordinary half-and-half solder is widely used for this class of work, pure tin is much stronger and has a much higher melting point than the half-and-half solder. A high-melting-point solder has recently been developed by one manufacturer which is used to solder the bands on all of his railway motor armatures. Reference to the table shows the relatively high melting point of this new alloy.

Materials	Melting Point Degrees Centigrade
Half-and-half solder	188
Pure tin	232
High-melting-point solder	300

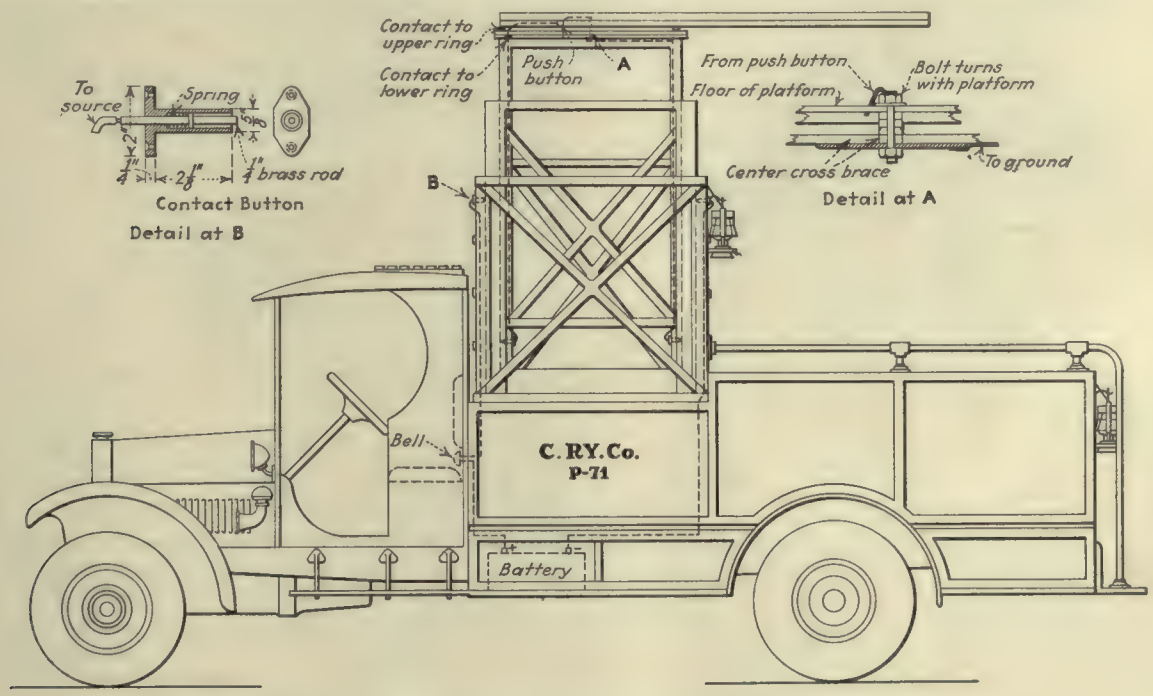
In connection with the use of this special alloy solder, the repairman will find it a big help to use a very hot soldering copper weighing about 5 or 6 lbs. This has been found essential to do a good soldering job on the bands.

Signal Bell on Tower Truck*

By H. A. Brown
Foreman Return Circuit, Switch and Signal Division
Cleveland Railway

POWER trucks of the switch and signal division of the Cleveland Railway have been equipped with signal bells, so arranged that a workman on top of the tower may signal the driver regardless of the tower height or position of the turntable. This device is a great help to the trouble crews, especially when working under noisy traffic conditions. Current for the signal is obtained from the regular battery, tapped at the required voltage, the iron tower leg plates and turntable being utilized as current conductors. The signal bell is mounted in the drivers cab and the push button control is mounted on top of the tower within convenient reach

**Submitted in* Electric Railway Journal *Prize Contest.*



Wiring diagram of signal system installed on tower trucks of the Cleveland Railway

of the workmen. In order to assure good electrical contact at all times between the tower leg plates and the table plate, reconstructed push buttons are used in which the center has been replaced by a piece of ¼-in. brass rod through which it is possible to pass current. The push buttons are mounted in each of the tower leg plates, with the binding posts electrically connected to the iron leg plates, and with the ¼-in. brass rod (under spring pressure) in sliding contact with the adjacent parallel tower leg plate. The same method is used for obtaining good electrical contact between the tower leg irons and the table plate. In this manner a closed circuit is provided when the control button is closed, regardless of the tower height or the position of the table. These bell installations have resulted in a saving of time both to the maintenance crews and to cars on the line approaching a point under repair.

Increasing Height of Span Wire Poles

FOLLOWING street widening operations in New Haven, an effective method was recently adopted by the Connecticut Company for increasing the height of its span wire poles. When the pole line was set back it became necessary to raise the height of the span wire connection to the pole in order to maintain the trolley wire at the proper elevation. This brought the span



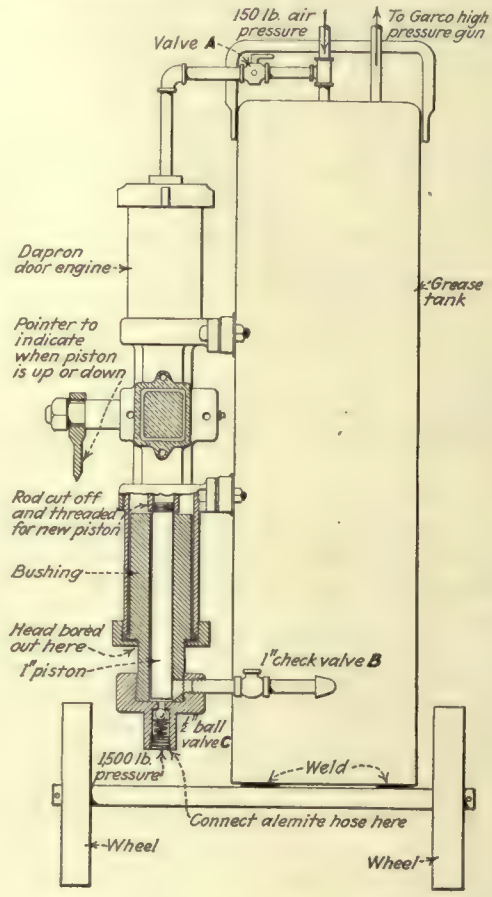
Pole height increased by clamping short extension to top of existing pole

wire too close to the feeder wires carried on crossarms at the top of the poles. Instead of installing taller poles, it was decided to add short sections of pipe to the top of the existing poles, holding the extensions in place by means of malleable iron clamps, as shown in the accompanying illustration. This permitted the necessary separation of the span wires and feeder wires without the expense of replacing the poles.

Door Engine Used for Pressure Lubrication*

By Charles Herms
General Foreman San Diego Electric Railway

FOR lubricating universal joints of the Spicer type, an obsolete door engine was reconstructed in the shops of the San Diego Electric Railway. With the aid of this apparatus, considerable time has been saved when universal joints had to be greased. A feature of this



Lubricating apparatus adapted from an old door engine by the San Diego Electric Railway Company

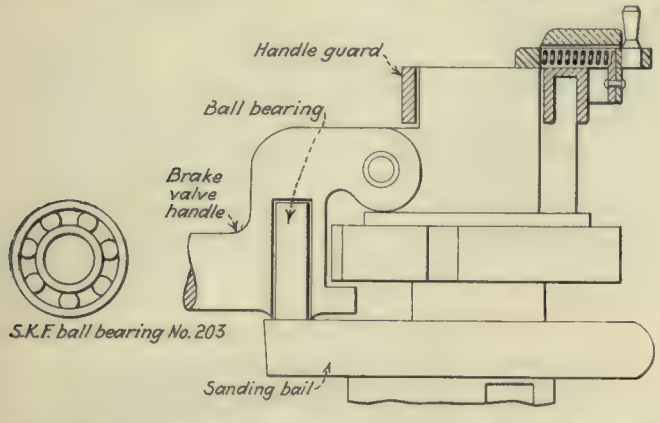
lubricator is that an indicator shows when the grease is entering the cylinder and when it is being pressed out and into the object to be lubricated. The apparatus has a nozzle pressure of 1,500 lb. and discharges 4 cu.in. of grease in ten seconds. It can be recharged in two seconds. To recharge the lubricator, a cock is turned to vent the air from the cylinder, after which the grease, under 150 lb. pressure, passes through the 1-in. check valve and forces the 1-in. piston up to its maximum position.

The Alemite hose also has a vent cock at the end which fastens on to the Alemite fittings. This is to permit the mechanic to cut off the flow of grease at will and at the same time release the pressure on the chuck so it can be removed from the fitting. A ½-in. ball valve is provided to prevent the compressed grease in the Alemite hose from expanding back into the 1-in. cylinder when releasing for recharge. The 1-in. bushing and head were made of an old car axle, while the piston of the same diameter has 0.002-in. clearance.

Ball Bearing Under Brake Handle*

By W. H. McAloney
Superintendent of Equipment Georgia Power Company
Atlanta, Ga.

ELIMINATION of wear on the sanding slide of the M-28 brake valve in general use on safety cars has been accomplished by the Georgia Power Company by placing an S.K.F. ball bearing under the handle. Wear on the slide of the brake valve handle formerly caused many complaints by car operators. In order to eliminate this trouble a type S.K.F. No. 203 ball bearing has been



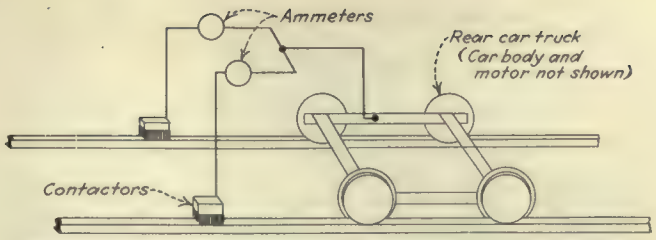
Ball bearing under brake handle has reduced wear of sanding bail on cars of the Georgia Power Company

installed in the brake handle, as shown in the accompanying illustration. This has greatly reduced the friction and overcome the wear on both brake handle and sand bail.

Detecting Broken Rails*

By Carl W. Evans
Underground Distribution Engineer
San Antonio Public Service Company

FINDING the location of broken rails has been greatly facilitated on the lines of the San Antonio Public Service Company by means of a car equipped with a direct-current ammeter on each rail and two steel-wire brushes used as track contactors. When trying to locate broken rails, the car is driven slowly over the track to



Broken rail is detected by the sudden swing of one of the ammeters shunted across a short section of track

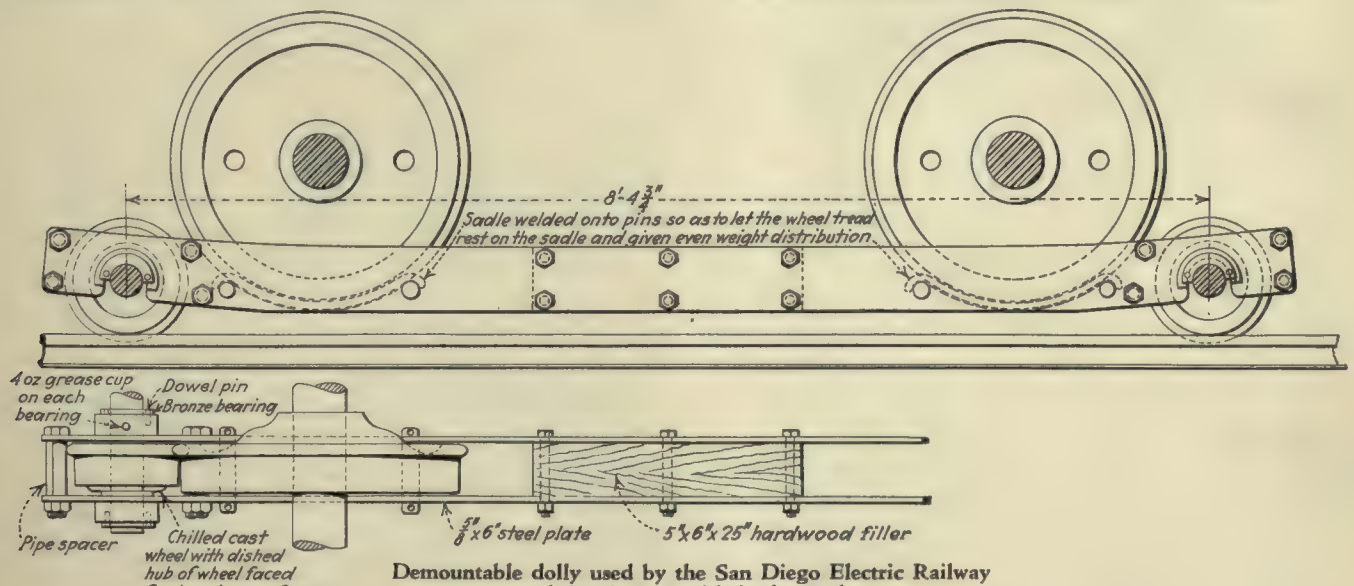
be tested. This is done after midnight when regular traffic has ceased, while one man is watching the ammeters. As long as continuity of the track is not broken the ammeters indicate only a small amount of current since they are shunted across only a short section of track. In passing over a broken rail, the ammeter shunted across the broken rail indicates almost the full car current during the interval that the break in the rail lies between the rail contactor and the wheels. If the car is traveling at a fair rate of speed the broken rail is indicated by a sudden swing of the ammeter, and notation is immediately made of the exact location.

Demountable Dolly Used in San Diego*

By Charles Herms
General Foreman San Diego Electric Railway

A DOLLY used by the San Diego Electric Railway to take the place of a street car's truck when one of the axles is broken consists of two axles with small wheels and two double side members resting on the axles, as shown in the accompanying illustration. This dolly can be assembled or taken apart in a few minutes. When using the dolly it is necessary to jack up the car, roll the dolly under it, and lower the car until the wheels rest on saddles between the sides of each member. Pins which support the saddles are made of 1½-in. steel bar. Due to the design of the dolly, the weight of the car is carried directly on the dolly wheels and no bending action is set up in the dolly axles.

**Submitted in* Electric Railway Journal *Prize Contest.*

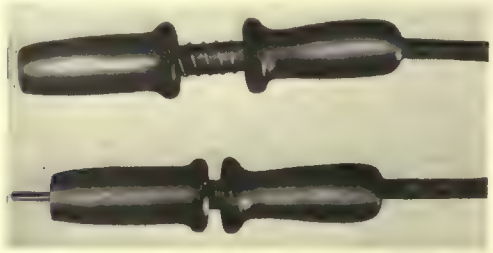


Demountable dolly used by the San Diego Electric Railway to bring in cars with broken axles

Insulating Sleeve Protects Test Points*

By T. E. Brindson
Electric Shop Foreman
Kansas City Public Service Company

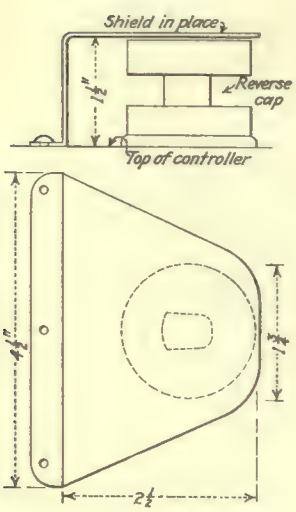
PROTECTION to the workmen engaged in testing electrical equipment in the shops of the Kansas City Public Service Company has been afforded by the development of an insulating sleeve which covers the positive test point. Previous to the development of this device both positive and negative test points were unprotected and workmen received electrical shocks on various occasions. With the new apparatus the negative point is left bare but the positive point is inclosed in fiber tubing inside a wooden sheath. When the apparatus is not in use this sheath covers the metal point, being held in position by a coiled spring. When it is desired to use the apparatus the sheath is pulled back thereby compressing the spring and leaving the test point exposed. This arrangement also provides protection for the test point should it fall on the floor or come in contact with grounded metal.



Fiber tubing in a wooden sheath protects positive point of electric testing apparatus. Above, sheath is in normal position over test point; below, the spring has been compressed, by pulling back the sheath and the test point is exposed

Reverser Protectors Prevent Tampering

By Benjamin H. Hall
Foreman West Penn Railways, McKeesport, Pa.



Sheet steel protectors on the reverse drums of controllers prevent tampering

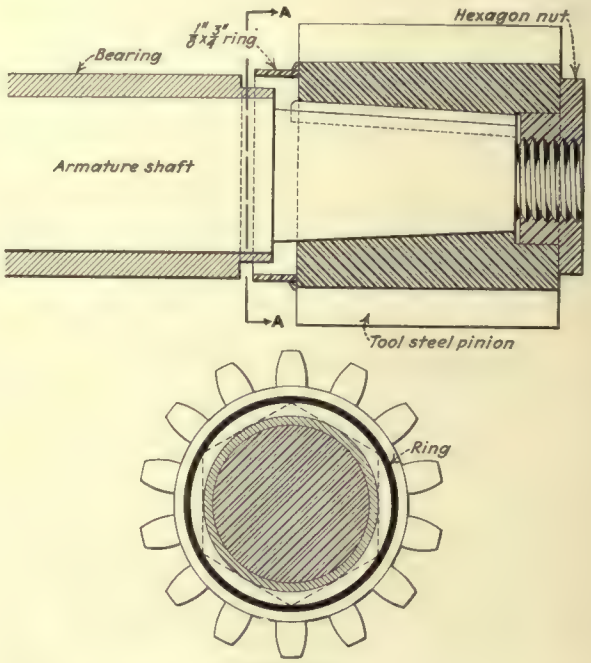
PROTECTORS have been installed on the tops of B-50 controllers by the West Penn Railways as a means of preventing passengers from turning the reverser barrels at the rear of the car with their hands. Without the shields it was found that passengers frequently would do this, making the rail brake inoperative or causing the motors to buck when the front end controller was turned on.

The protector is made of $\frac{1}{16}$-in. sheet steel and is fastened by means of three machine screws tapped into the top of the controller case. Dimensions and the method of installation are shown in the accompanying diagram. It costs little to install these shields and their use has removed a source of annoyance. As a safety precaution, they may save lives and damage to equipment.

Preventing Grease from Entering Armature Bearing

By W. B. Osborn
Master Mechanic
Southern Public Utilities Company
Charlotte, N. C.

TO PREVENT the heavy grease used for lubrication of gears from entering the armature bearing, the Southern Public Utilities Company, Charlotte, N. C., has adopted the practice of welding a ring to the pinion. This ring is placed against the pinion, on the opposite side from the nut which holds it on the armature shaft. A soft steel band of $\frac{1}{8}$x$\frac{3}{4}$-in. dimensions is used for the ring, the diameter depending on the size of the shaft. The bearing should be turned down at the pinion end in order to leave a little space between the bearing and the ring attached to the pinion. This method of preventing the heavy grease from entering the armature bearing has been used at Charlotte for several years and results have proved to be most satisfactory.

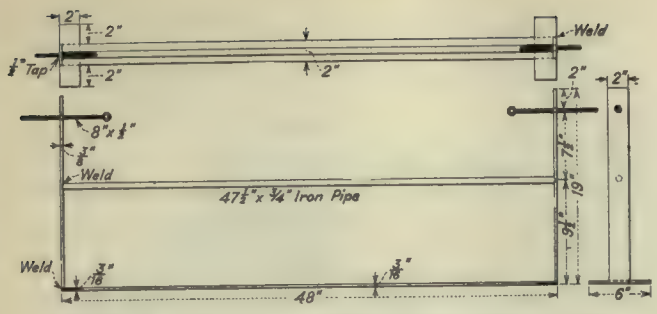


Ring attached to pinion prevents heavy gear grease from entering the armature bearing

Bus Wheel Aligner*

By W. R. Faircloth
Garage Foreman Virginia Electric & Power Company
Portsmouth, Va.

ACCURATE wheel alignment for buses of the Virginia Electric & Power Company at Portsmouth, Va., has been attained by the use of a wheel aligner, made in the company shops. The device used for this purpose has a base made from 2x$\frac{3}{16}$-in. flat iron with a



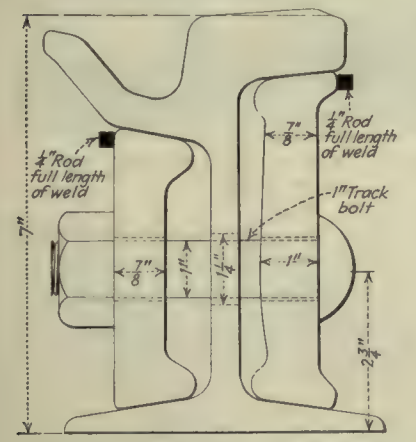
Aligner for wheels has reduced tire wear on buses of the Virginia Electric & Power Company

piece of ¾-in. iron pipe serving as a brace for two 19-in. uprights of 2x⅜-in. flat iron. Two ½-in. bolts 8 in. long are inserted through a ½-in. tap and can be so adjusted as to fit flush against the tire rims. In use the aligner is placed first in front of and then in the rear of the axle, permitting the mechanic to see at a glance whether or not the wheels are parallel. It was made at a cost of only $2.50. The life of tires has been greatly increased since the aligner has been in use, while the number of replacements is decreasing steadily.

Iron Rod Acts as Dam for Weld Metal*

By F. B. Habercam
Superintendent of Welding
United Railways & Electric Company
Baltimore, Md.

WHERE it is desired to electric seam weld rail joints fitted with standard bolted joint plates, the United Railways & Electric Company of Baltimore finds it effective to use a piece of ¼-in. square iron along the entire top edge of the plates as a dam for the weld metal. The ends are welded to hold the rod in place, and the usual welding procedure is then followed. This method applies where the splice bars are not disturbed, but whenever possible it is better to dismantle the joint and, while the splice bars are off, weld the ¼-in. square rod along the under side, to the bars. The joint is then reassembled and welded in the usual manner. The weld can be puddled so that the ¼-in. square rod, splice bar and rail are all thoroughly welded, with a maximum depth of penetration. This method may be used on any type of joint where there is not sufficient welding shelf on the splice bars. It applies particularly to cases of joint repairs to old bolted joint track, where it has been found satisfactory.



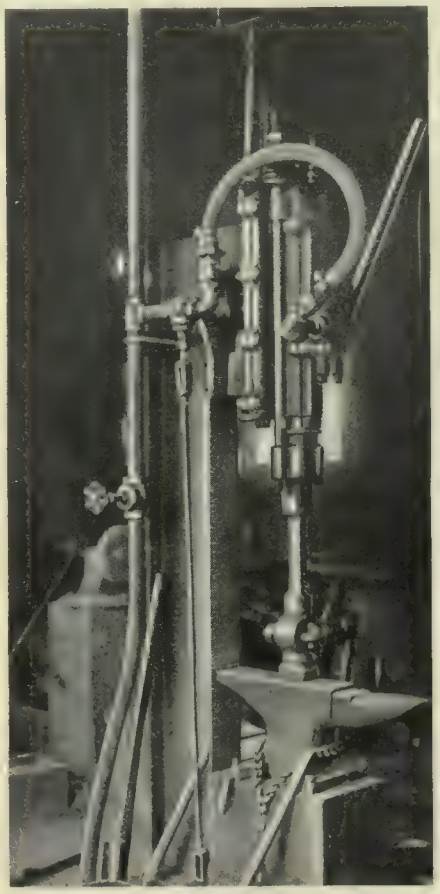
Iron rod is used by United Railways & Electric Company instead of copper as dam for weld metal in repairing rail joints

Submitted in Electric Railway Journal Prize Contest.

Hammer Operated by Compressed Air*

By A. G. Pirkle
Assistant Engineer Roadway Department
Georgia Power Company
Atlanta, Ga.

BY CONVERTING an old 3⅝-in. rock drill into a compressed air hammer, the Georgia Power Company has obtained an efficient machine for maintaining roadway tools such as tampers, cleavers, picks, etc., on which there is a considerable amount of blacksmith work to be done. The drill was mounted on a 10-in. I-beam anchored 4 ft. in concrete, and fastened to it by 3¼x5-in. steel plates bolted to the flange of the I-beam with 10⅝-in. bolts. The plates were bent and the ends welded to the frame of the drill. A ratchet which caused the drill to rotate at each stroke was removed. The hammer was forged from tool steel to the desired size and shape, and the stem made to such diameter and length as to fit in the drill socket. The hammer is held in the socket with a 1-in. U-bolt, in the same manner as the drill. Air pressure of 100 lb. is used in operating the hammer and a foot control was installed whereby the air valve may be opened or closed as the case may be. The feedscrew in the top is used in raising or lowering the hammer to suit the various sizes of work. It is estimated that at least three times as much work can be done with the air hammer than with a hand hammer in the same amount of time.

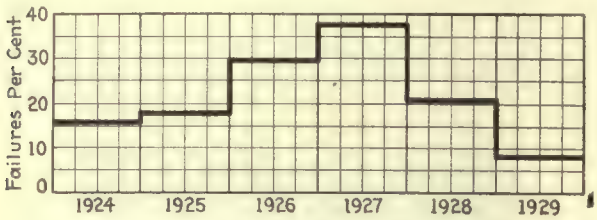


Air hammer made from an old rock drill speeds up blacksmith work in the track department of the Georgia Power Company

High Voltage Test Discloses Equipment Weakness

By H. S. Williams
Assistant Superintendent of Equipment
Department of Street Railways, Detroit

PREVENTION of equipment failures in service has resulted in Detroit from the use of a high voltage breakdown test. So successful has it been that the Department of Street Railways now makes it a practice to give all cars coming into the shops a test with 1,500 volts alternating current between wiring and ground.



Equipment failures have been reduced at Detroit, due largely to high voltage tests

During 1924 and 1925, when this system was first used, not all incoming cars were tested, so the maximum benefit was delayed. In 1927, however, all were "shot" with a resulting breakdown of 38 per cent of the cars. The following year the number of cars which showed failure was reduced to 21 per cent and so far this year further reduction is apparent. In 1924 when these high potential tests were started the record showed a little over 7,000 miles per pull-in while the 1929 record shows over 14,000 miles. While this improvement is not due entirely to the high voltage testing, a large share of it is attributed to this method of detecting weakness.

Portable Oxyacetylene Apparatus*

By A. B. Copeland
Superintendent of Construction Way Department
Cleveland Railway

TO ELIMINATE the cumbersome handling of an oxyacetylene burning outfit, the Cleveland Railway has designed a special truck to carry the necessary apparatus. Often it was found that trucks or cars equipped with cutting equipment could not reach desired spots because insufficient room was available for maneuvering. The small carriage developed to solve this problem can be moved into any small space. It is mounted on two wheels of 12½-in. diameter, and when not in use stands in an upright position. A platform to support the tanks is made of two layers of 1½-in. oak plank, two holes being cut in the top layer to accommodate the lower ends of the tanks. This arrangement, together with a metal clamping strap at the top, holds the tanks firmly in position. A removable box, attached to the top of the truck, contains gages, tools and other implements. In the lower compartment of this box is a special space for carrying the hose. The weight of the carriage, equipped, is 600 lb.



Portable truck for oxyacetylene burning outfit used by the Cleveland Railway

Lighted Brooms Help Coach Cleaners*

By Hoy Stevens
Superintendent of Maintenance Motor Coach Department
Cleveland Railway



Lighted brooms facilitate sweeping coaches at night in the Cleveland Railway garage

ILLUMINATED brooms are one of the novelties developed in the coach maintenance department of the Cleveland Railway. The unit, as illustrated, consists of a broom, lamp, wire guard, extension cord and reel, the latter mounted on a standard dust box. The outfit is simple, and was made from ordinary garage supplies.

With this arrangement it is possible to illuminate any part of the floor of the coach, regardless of its location in the garage, and with little or no delay from short or tangled extension cords. The dust box can be run under the rear door of a double-deck coach or the front door of a single-deck coach. The floor can be swept thoroughly and dust and dirt seen where formerly they were not noticed, on account of the dark. The garage lights were found of little value and even the interior lights of the coach did not illuminate under the seats, in corners or under heater pipe guards. Morever, when the battery voltage was low the lighting was poor and it was not advisable to keep all the lights on for the time needed to do the cleaning.

**Submitted in* Electric Railway Journal *Prize Contest.*



Exterior of B.-M.T. mechanical department supply car

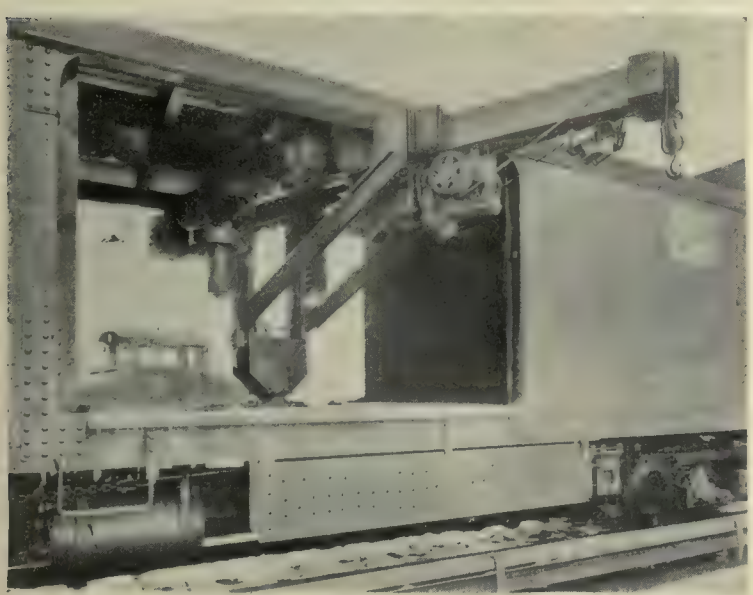
Supply Car for B.-M.T. System

WHILE repairs to equipment for subway and elevated cars of the Brooklyn-Manhattan Transit System ordinarily are made at the Coney Island shops, it is frequently necessary to change armatures, field coils and wheels at other shops. To transport material to and from various shops a supply car is used. The car used for this purpose is provided with equipment for rapid and easy handling of heavy parts and for safe and convenient storage during transportation.

The car is equipped with a 2-ton circular crane in the center portion which is arranged to handle material in and out of the side doors. This crane is electrically operated and easily lifts and lowers material that formerly had to be loaded and unloaded upon flat cars or in box cars by manual labor when transported from one shop to another. The crane is circular and may be swung out either side of the car when the doors are open, and an electrically-operated extension may be projected from the arm, if it is necessary, and then withdrawn back inside the arm when the crane is ready to be swung back into the car. A switch near the motorman's cab controls the power for the operation of the crane, so that it cannot be operated unless the switch is thrown in place. This is one of many safety features governing the operation of the crane.

Loading and unloading are done by the shop forces and not by the car crew. A shopman at each shop is instructed in the operation of the crane and his task on the arrival of the car is to operate it. The car resembles a U. S. mail car in appearance, with sliding doors on either side. It is painted red and has the symbol of the B.-M.T. Lines in colors. It is 48 ft. 3 in. over all and is 8 ft. 7 in. wide. The car body itself is 37 ft. 6 in. long with open platforms at either end on which guard rails are mounted.

About 72 sq.ft. of open storage space is provided at one end of the car for large size material, while the other end is occupied by steel lockers which are suspended from the ceiling. These are used for small size material and for broken lots. Room is also provided for the storage of some material under the lockers. The center of the car is taken up by the crane.



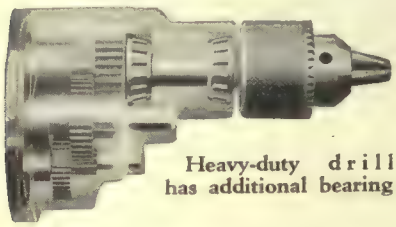


The circular crane is swung out of the door with extension projecting. At right, end view of the car

New Products for the Railways' Use

Chuck Spindle Equipped with Roller Bearings

TO PROVIDE for double thrust which occurs in cylinder reconditioning work, an additional roller bearing has been introduced in the chuck spindles of the $\frac{5}{8}$-in. and $\frac{3}{4}$-in. heavy-duty drills manufactured by



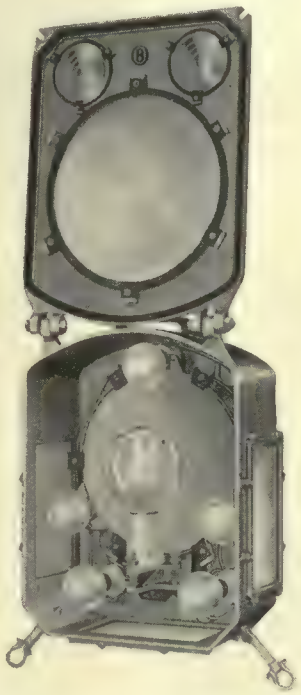
Heavy-duty drill has additional bearing

the United States Electrical Tool Company, Cincinnati, Ohio. It is claimed that this additional bearing facilitates operation and prolongs the life of the drill.

Special Dash-Illuminating Headlight

INCORPORATING the advantages of the standard O-B Type DCP 500-watt incandescent headlight, a new interurban light has been designed which illuminates the car dash and also provides sufficient track illumination for city and suburban service. Completely enclosed in an aluminum case, weighing only 29½ lb., it is fitted with a heat-resisting plain glass lens in the door, an 11-in. glass reflector and a 500-watt incandescent lamp set in a mogul receptacle making it possible to pick up dark objects as far away as 1,500 ft. in clear weather. Dash illumination is furnished by means of five smaller lamps connected in series and arranged to direct the light beams through prismatic lenses set in the sides and bottom of the headlight case. When in use in interurban service, the 500-watt lamp with the aid of the prisms supplies the dash as well as the track illumination. Dimming is accomplished by cutting out the large light and only employing the five small lights, using a single switch fitted with two on and one off positions. Two of the five smaller lights are set directly behind 4-in. semaphore lenses in the bottom of the door. These lights are sufficient to pick up switch points while traveling at a moderate rate of speed.

This new headlight is made for either portable or stationary mounting and can be used on any car wired for 4-amp. headlights, and using resistances of 500 watts and 115 volts. The five small lights are in-

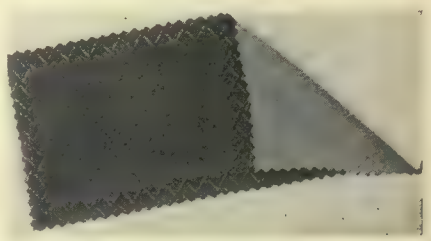


Headlight manufactured by the Ohio Brass Company illuminates both dash and track

terchangeable with the lights used inside the car within the range of 23 to 56 watts. This apparatus is designed to provide adequate illumination at all times.

Waterproof Upholstery Material

NUMEROUS advantages are claimed for a new waterproof upholstery material recently brought out by Lesher-Whitman & Co., Inc., 881 Broadway, New York. The front surface of this material is mohair cloth while the back is coated with 14-oz. rubber. Since moisture does not damage the fabric, it can be cleaned by washing in the regular way. The smooth, hard surface is said to retain its original freshness for a long time. It is also moth proof and vermin proof. These qualities are



A new upholstery material with mohair surface and rubberized back

said to make it an extremely serviceable material for upholstering the seats of electric railway cars and buses.

Car Loading Plate with Patterned Surface

LOADING of freight cars is said to be facilitated by use of a "diamondette" plate developed by the Alan Wood Steel Company of Conshohocken, Pa. This plate is rolled from open hearth steel, of either $\frac{5}{16}$-in. or $\frac{3}{8}$-in. thickness. It has a raised, patterned surface which will accommodate the smallest of truck wheels without jolting or shifting the load. The raised diamonds give the truck operator a firm foothold, the absence of which in plain plates has created a certain hazard. "A.W." diamondette car loading plates are flanged on one end and bevelled on the other end. This construction automatically gives the plate a grip on both car floor and platform as soon as the load comes on to the plate.



Patterned loading plate facilitate car loading

Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Market Street Railway, San Francisco, Cal.					
February, 1930	728,404	678,268*a*		100,136	44,224*j*
February, 1929	724,808	629,915*a*		94,893	34,852*j*
12 mo. end. Feb., 1930	9,585,605	8,028,102*a*		1,557,503	856,289*j*
12 mo. end. Feb., 1929	9,683,273	8,292,217*a*		1,391,056	654,679*j*
Jacksonville Traction Co., Jacksonville, Fla.					
January, 1930	94,815	80,597	9,271	4,525*b*	
January, 1929	97,358	77,139	9,683	10,012*b*	
12 mo. end. Jan., 1930	1,138,597	932,048	108,478	92,045*b*	*66,055*
12 mo. end. Jan., 1929	1,192,756	964,371	107,033	114,895*b*	*48,303*
Honolulu Rapid Transit Co., Honolulu, Hawaii					
January, 1930	86,856	54,506	8,819	24,771	12,943
January, 1929	88,606	51,591	12,861	25,375	14,164
Chicago Surface Lines, Chicago, Ill.					
January, 1930	5,239,755	4,043,147*a*		1,196,608	909,248*c*
January, 1929	5,400,638	4,236,029*a*		1,164,610	887,843*c*
Chicago Surface Lines, Chicago, Ill.					
February, 1930	4,751,766	3,900,460*a*		851,306	711,622*c*
February, 1929	5,014,245	4,017,519*a*		996,726	785,195*c*
United Railways & Electric Co., Baltimore, Md.					
January, 1930	1,423,517	987,151	141,261	306,012	24,005
January, 1929	1,387,494	977,061	136,634	286,127	2,326
Boston Elevated Railway, Boston, Mass.					
January, 1930	3,101,063	2,087,830	133,033	891,811	195,210
January, 1929	3,072,585	2,155,799	146,888	780,384	74,244
Eastern Massachusetts Street Ry., Boston, Mass.					
February, 1930	684,616	418,490	29,090	247,197	67,278
February, 1929	726,869	437,655	32,695	271,772	79,797
2 mo. end. Feb., 1930	1,443,429	866,775	66,846	529,557	149,734
2 mo. end. Feb., 1929	1,523,272	928,746	68,412	558,603	160,489
Department of Street Railways, Detroit, Mich.					
February, 1930	1,922,327	1,568,683	65,090	297,112	158,026
February, 1929	2,248,074	1,830,216	62,516	362,386	242,466
12 mo. end. Feb., 1930	25,883,821	20,645,509	756,068	4,588,792	2,897,415
12 mo. end. Feb., 1929	25,210,645	19,795,532	774,108	4,874,814	3,020,617
Kansas City Public Service Co., Kansas City, Mo.					
February, 1930	689,173	576,085*a*		113,089	38,488*g*
February, 1929	724,758				57,760*g*
2 mo. end. Feb., 1930	1,451,109				80,230*g*
2 mo. end. Feb., 1929	1,505,233				128,930*g*
Illinois Terminal Co., St. Louis, Mo.					
January, 1930	577,391	421,931	24,000	131,461	84,226*e*
January, 1929	625,190	424,748	21,262	179,160	135,303*e*
St. Louis Public Service Co., St. Louis, Mo.					
December, 1929	1,649,588	1,213,820	167,781	276,920	127,413
December, 1928	1,656,372	1,026,067	177,217	448,419	292,118
12 mo. end. Dec., 1929	19,249,779	14,326,528	1,922,814	3,005,363	1,155,461
12 mo. end. Dec., 1928	19,451,917	14,616,828	1,885,450	2,916,566	1,043,401
Omaha & Council Bluffs Street Railway, Omaha, Neb.					
January, 1930	236,776	186,397		10,870	*36,450*
January, 1929	262,443	186,387		47,358	1,138
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
January, 1930	94,674	68,018	4,800	27,113	*8,899*
January, 1929	89,222	64,785	7,840	19,042	*12,573*
Brooklyn-Manhattan Transit Corp., New York, N. Y.					
February, 1930*f*	4,628,946	3,020,029	340,311	1,339,361	569,829
February, 1929	3,687,623	2,309,625	278,152	1,156,008	438,909
8 mo. end. Feb., 1930*f*	40,172,997	26,825,506	2,593,973	11,340,666	5,136,488
8 mo. end. Feb., 1929	31,800,539	20,616,110	2,219,268	9,568,432	3,984,859
Brooklyn & Queens Transit Corporation, New York, N. Y.					
February, 1930	1,775,394	1,383,112	114,014	297,995	171,777
February, 1929	1,809,557	1,463,427	104,835	262,345	133,606
8 mo. end. Feb., 1930	15,682,525	12,352,784	914,683	2,585,683	1,575,311
8 mo. end. Feb., 1929	15,880,622	13,192,947	843,565	2,006,023	976,362
Fifth Avenue Coach Co., New York, N. Y.					
October, 1929	525,185	460,847*a*		76,770	76,042
October, 1928	585,673	479,999*a*		106,130	103,640
4 mo. end. Oct., 1929	2,199,959	1,778,922*a*		409,326	406,760
4 mo. end. Oct., 1928	2,321,584	1,845,923*a*		432,853	422,894
Hudson & Manhattan Railroad, New York, N. Y.					
February, 1930	992,769	497,424		495,345	161,096
February, 1929	992,536	501,781*a*		490,754	155,354
2 mo. end. Feb., 1930	2,080,454	1,046,635*a*		1,039,818	361,951
2 mo. end. Feb., 1929	2,053,427	1,047,726*a*		1,005,700	334,782
Interborough Rapid Transit Co., New York, N. Y.					
January, 1930	6,407,365	3,885,013	210,522	2,311,829	*210,329d*
January, 1929	6,081,211	3,810,916	203,735	2,075,559	278,382*d*
7 mo. end. Jan., 1930	42,157,170	26,381,006	1,412,955	14,363,208	*1,139,508d*
7 mo. end. Jan., 1929	39,743,556	24,884,036	1,402,830	13,456,689	853,983*d*
Long Island Railroad, New York, N. Y.					
January, 1930	2,929,253	2,346,899	99,372	482,882	341,626*e*
January, 1929	2,904,424	2,264,348	91,756	544,973	409,699*e*
New York, Westchester & Boston Ry., New York, N. Y.					
January, 1930	211,322	122,640	24,308	65,093	*166,494*
January, 1929	190,835	130,851	18,793	41,911	*172,616*
Staten Island Rapid Transit Co., New York, N. Y.					
January, 1930	188,377	152,249	17,500	18,628	9,879*e*
January, 1929	228,151	176,209	19,000	32,937	*1,782e*
Philadelphia & Western Railway, Norristown, Pa.					
January, 1930	62,319	53,043			9,276
January, 1929	65,624	55,543			10,081
12 mo. end. Jan., 1930	801,663	630,388			171,275
12 mo. end. Jan., 1929	838,698	656,765			181,933
Philadelphia & Western Railway, Norristown, Pa.					
February, 1930	52,923	51,190*h*			1,733
February, 1929	58,218	51,353*h*			6,865
2 mo. end. Feb., 1930	115,242	104,233*h*			11,009
2 mo. end. Feb., 1929	123,842	105,896*h*			17,946
United Electric Railways, Providence, R. I.					
December, 1929	643,070	588,373		54,697	5,217
December, 1928	656,657	605,758		50,899	*557*
12 mo. end. Dec., 1929	7,193,230	6,272,354		1,007,506	397,237
12 mo. end. Dec., 1928	7,423,475	6,482,551		1,027,483	410,597
Galveston-Houston Electric Railway, Houston, Tex.					
January, 1930	41,658	24,921	2,658	14,078	
January, 1929	46,782	26,882	2,574	17,325	
12 mo. end. Jan., 1930	579,366	327,059	32,441	220,058	*49,859*
12 mo. end. Jan., 1929	639,405	367,301	31,753	240,350	*29,769*
Houston Electric Co., Houston, Tex.					
January, 1930	271,140	175,685	23,422	72,032	
January, 1929	281,336	181,205	25,499	74,630	
12 mo. end. Jan., 1930	3,365,661	2,080,284	271,848	1,028,328	630,538
12 mo. end. Jan., 1929	3,355,797	2,073,295	291,505	990,995	578,946
Pacific Northwest Traction Co., Seattle, Wash.					
January, 1930	76,618	59,628	5,813	11,175	
January, 1929	69,452	63,565	5,589	297	
12 mo. end. Jan., 1930	971,238	713,439	54,400	203,397	84,756
12 mo. end. Jan., 1929	879,345	741,635	52,323	85,386	*64,048*
Calgary Municipal Railway, Calgary, Alta.					
January, 1930	99,705	54,199		45,506	19,791
January, 1929					16,243
Edmonton Radial Railway, Edmonton, Alta.					
January, 1930	85,235	53,022		32,213	2,327
January, 1929	79,112	46,258		32,854	3,506
Regina Municipal Railway, Regina, Sask.					
January, 1930	48,149	28,693		19,456	7,662
January, 1929					7,730

a Includes taxes. *b* Net operating revenue. *c* Balance for return on investment. *d* In 1930 payment for rental on Contract No. 3 of $737,996 for January and $2,947,966 for the seven months were made to the city of New York which were not made in 1929. *e* Net after joint facility and equipment rents. *f* Including Brooklyn & Queens Transit System. *g* Before reserves. *h* Operating and income deductions. *j* Before depreciation and federal taxes.

Business Conditions Show Improved Trend

ROBERT M. DAVIS, statistical editor of the McGraw-Hill Publishing Company, Inc., publisher of ELECTRIC RAILWAY JOURNAL, says there is little doubt but that the closing weeks of the first quarter of the year witnessed a distinct upward trend in general trade and industrial operations. He has just returned from a 17,000-mile tour which covered every section of the United States, and advances as a composite view of business men that while current business is only fair and collections are slow, both are decidedly more favorable than was thought possible last November and that material improvement may be expected as the spring opens up. Mr. Davis sees the general business and industrial outlook for the second quarter as well as for the remainder of 1930 distinctly favorable as the first quarter closes. With most of the industrial groups, including general construction, now definitely on the upgrade, and general trade expanding with the unusually late spring demands, prospects are brighter than at any time since the recession set in last fall. Admittedly, the first quarter of the year was definitely one of adjustment to an entirely different economic plane, but the year 1930 promises to stand out as one of unusual stability in trade and industry. Mr. Davis feels that the closing months of 1930 should witness the opening of a period of prosperous business and industrial operations.

NEWS *of the Industry*

LATE NEWS

Seattle, Wash.—Roy E. Furse, superintendent of transportation for the municipal railway and bus system, requests operators so to regulate the running time of buses that they will arrive at transfer points just about the time street cars arrive with which their service must connect. He is endeavoring to arrange schedules so as to help make meetings easy.

✦

Philadelphia, Pa.—Trial operation of the $10,000,000 South Broad Street subway begins when the first train is run from the City Hall to South Street. Thorough tests for clearance and operation of switches and signals are being conducted under supervision of Transit Director Myers and H. M. Van Gelder, electrical engineer of the department.

✦

Fort Worth, Tex. — The Northern Texas Traction Company is reported to contemplate the removal of its tracks from these thoroughfares when the work of widening and repaving Azle Avenue and 25th Street from North Main Street to the city limits is begun by the city early in May. The plan is to substitute service by bus. It has been stated unofficially that seven new vehicles will be bought for this service, but up to March 25 the new equipment had not been ordered although the orders were said to be pending.

✦

Louisville, Ky. — Employees of the Louisville Railway operated an average of 42,264 miles per accident in February. Five street railway lines and seven bus lines were operated with a record of 100 per cent safety during the month.

✦

Albany, N. Y.—Ernest Murphy, president of the New York Electric Railway Association and executive of the United Traction Company, Albany, made a plea to the Legislature on March 25 to relieve the trolley lines of the state of the costs of the paving between their tracks under the terms of the so-called Thayer bill.

✦

Chicago, Ill.—Tuesday, June 17, has been set tentatively by the City Council's local transportation committee as the date for submitting the new railway co-ordination ordinance to a referendum vote in Chicago. If the referendum is not held by that date the committee members are confident that it will be within two or three weeks from then. A special election would be called, to be paid for out of the city's traction fund.

✦

San Francisco, Cal.—The Board of Public Works has directed Fred Boeken, superintendent, Municipal Railway, to install meters on municipal street cars to check the amount of power used.

(*Late News Continued on Page 232*)

The Interstate Bus Bill Passed by House March 24

Regulatory Measure Providing Board of Administration Amended Slightly. Large Majority Recorded. Goes Now to Senate for Approval

WITH slight amendments to the grandfather clause and the administrative sections, the House passed the Parker interstate bus bill on March 24 by a vote of 219 to 115. Although the opposition was somewhat more pronounced than had been expected it was not altogether surprising to House leaders, who anticipated that effective use would be made of the "state rights" argument. Despite these protests and the objections of those opposed to bus operation by steam and electric railways, it was evident during the passage of the bill that the majority of the House members do not look with suspicion upon long-distance operations by large companies.

This was indicated by the ease with which amendments were voted down that sought to prevent the acquisition of interstate bus lines by competing carriers. Other amendments designed to restrict bus operations by steam carriers and electric railways also were rejected. It was decided, however, to adopt a provision to permit the establishment of competing service in cases where the existing bus line is operated or controlled by a railroad. In this connection, the charge was made that the bill was not conceived to answer public demand, but was written by the steam and the electric railways.

The administrative section was amended so as to provide for the extension of greater regulatory powers to the state groups at the discretion of the Interstate Commerce Commission. In bus operations covering no more than three states, the groups of state commissions already are permitted to initiate regulation. The amendment allows the Interstate Commerce Commission to refer matters pertaining to regulation to groups of more than three states. At the suggestion of members of the committee that drafted the bill, it was agreed to make decisions by the state groups by a majority of the members rather than by unanimous consent, as was provided in the original language.

It was also decided to permit the state boards to waive such matters of regulation as they may agree upon and to allow the Interstate Commerce Commission to make direct determination of the points involved. In this manner, smoother enforcement is provided and the state boards are relieved of the necessity of deciding questions considered of minor importance, it was stated. As to the grandfather clause, as the section is called dealing with the issuance of certificates for operation, an amendment was adopted that extends the time of priority of operation from Jan. 1 to March 1, 1930. It is thus provided that bus lines that were in operation on March 1 shall be given prior consideration in the issuance of the authorizing certificates.

The bill now goes to the Senate.

COMING MEETINGS

April 4—Metropolitan Section, A.E.R.A., Engineering Societies Building, New York.

April 9-10 — Central Electric Railway Master Mechanics Association, Mansfield, Ohio.

April 29-May 1—United States Chamber of Commerce, Washington, D. C.

May 14-15—Association of Electric Railway Equipment Men, Middle Atlantic States, Scranton, Pa.

June 23-26—American Electric Railway Association, 49th annual convention, San Francisco, Cal.

July 23-25 — Electric Railway Association of Equipment Men, Southern Properties, Nashville, Tenn.

Fare Case on Chicago "L" Dragging

Corporation Counsel Ettelson of Chicago, called upon by the City Council three months ago to explain his handling of the elevated rate case, has failed to meet the Council's demand. His reply to inquiries is "too busy." The plea of the Chicago Rapid Transit Company, made to the Illinois Commerce Commission two years ago, was backed by a mass of testimony in favor of increased fares, but was combatted by only one witness for the city. Attorneys for the "L" lines obtained the raise on a temporary injunction from the federal court, and there the matter has rested. Two weeks ago Mr. Ettelson sought an order from the federal court to force the city to appropriate money to enable him to continue litigation, which involves appraisal of the properties of the elevated company. The Council also asked Mr. Ettelson to report on the leases under which the Chicago, North Shore & Milwaukee, the Aurora, Elgin & Chicago and other lines enter Chicago over the tracks of the "L" and on the question of whether the federal court has any jurisdiction to rescind or revise these leases.

New Snow Fighting Methods Adopted in Buffalo

Alertness of International Railway Wins Editorial Commendation from Local Newspapers—Plea for Public Co-operation Effective

LAST winter the International Railway, Buffalo, N. Y., maintained the largest snow-fighting fleet of equipment in its history. It comprised 30 plows of two different types, 23 sweepers, one ice cutter and 18 trucks to sand viaducts as well as to transport switch and shovel gangs from point to point.



Parked cars rob the city of the use of half the street, forcing snow fighters to readjust their equipment to clean around the parked cars

Within the city limits of Buffalo, the company operates 220 miles of track and its total system covers 450 miles of track. During the winter, the company kept a staff of more than 200 men ready for snow fighting. Men who do this work are paid on a basis of time and a half for actual time on the snow-fighting equipment.

While snow fighting was at its peak during December, the company placed a poster in all stations commending car operators for their helpful co-operation. This poster said:

I.R.C. Co-operators:
Every one of you is to be heartily congratulated and commended for your super-cooperation during the many trials we have endured during the past week.
Beset by almost every conceivable handicap—sleet, snow and the partial destruction of our car shops, capped by the severe blizzard on Friday—every man on the system threw himself into the fray and made it possible for I.R.C. to continue its service to the Niagara area.
I wish I might shake the hand of every one of you—your accomplishment makes me more proud than ever of the splendid body of I.R.C. men for whom no task is too great.

B. J. Yungbluth, President.

Folders placed in the "Read As You Ride" boxes on all street cars and buses urged the public to co-operate in the effort to fight snow and keep traffic moving. A bulletin signed by President Yungbluth gave five suggestions for helping to maintain adequate service. They were:

Clear only such sidewalk space as is necessary for free movement of pedestrians.
Heap all snow along the curb. Avoid throwing it into the street.
Discourage parking on main arteries and all-night parking on any trolley street.
Discourage the practice of backing trucks to the curb.
Encourage your motoring friends to keep clear of street car tracks, when they can, so that the vast majority of users of city streets, who ride the street cars, may have an unobstructed right-of-way, and may reach their destinations without delay.

Letters embodying similar recommendations were sent by President Yungbluth to officials of all the community business organizations in Buffalo with the suggestion that the recommendations be given the widest possible publicity. The company pointed out in these letters that all-night parking on streets where car lines are operated interrupts the efficient cleaning of the streets of snow from curb to curb, thus forcing motor vehicle traffic into the car tracks with subsequent delays and congestion.

Formerly the railway cleared its own tracks and left the accumulated snow along the rails where it was removed by the city operating large fleets of snow plows. As a result thousands of automobiles and trucks attempted to get through the narrow lane cleared for street cars, causing partial paralysis of traffic. To meet this problem, the railway redesigned and rebuilt its entire snow-fighting equipment. Wings that reach all the way to the street curb were attached to special heavy car bodies with the result that during the recent winter the company cleared snow from all streets upon which it operates cars from curb to curb. This placed an additional financial burden upon the company, but it eliminated traffic congestion almost entirely so that the number of cars reported on time at terminals reached a new high figure.



Midnight photograph showing how a parked automobile blocks the snow fighters in their effort to rid the streets of snow from curb to curb

Ambitious New Jersey Rapid Transit Plan Revived

Officials of the North Jersey Transit Commission have announced their intention to submit to Governor Morgan F. Larson within the next two weeks a recommendation for enactment of pending legislation to create a rapid transit financing body.

The pending bill calls for creation of a district or regional plan organization, in the nature of a public corporation, to finance any or all of the comprehensive program included in the 1926 report.

The legislation now pending in Trenton would, if passed, provide the machinery for carrying out, in part or in whole, the recommendations of the 1926 report. The commission has already adopted a general policy of pushing the local New Jersey improvements first. The 1926 report suggested a Manhattan loop originating in the Jersey meadows near the present Manhattan Transfer, and running by tube to Battery Place, in New York City, and thence uptown to 57th Street and thence crosstown and under the Hudson River to New Durham and back to the point of origin.

The report called also for a Paterson-Newark-Irving high-speed line. Included in the report were suggestions for other rapid transit routes serving the 240 municipalities in the North Jersey area. It was suggested that the Manhattan loop could be operated by the Interborough, or, failing that, by the Hudson & Manhattan Railroad.

LATE NEWS

(*Continued from Page* 180)

Rochester, N. Y. — The New York State Railways, Rochester Lines, has established a corps of uniformed motorcycle officers to patrol its lines and terminals. The object is to prevent boys from stealing rides on the rear of street cars and buses, to guard company property from vandalism and to protect patrons in stations on the outskirts, particularly at night. The men assigned to this work will be equipped with high-speed cars. The city police are co-operating with the railways.

✦

Toronto, Ont.—Comptroller Robbins, secretary of the Toronto Street Railway Employees' Union, has announced that the 38 trainmen who lost employment when the Toronto Transportation Commission abandoned the Metropolitan Radial Railway had been absorbed into the Toronto system.

✦

Wilmington, N. C.—Formal application for the privilege of modifying and extending the operation of the bus service previously granted to the Tide Water Power Company on Market Street to Seventeenth Street, so that the service may be continued through the downtown section and back out to East Wilmington, via Grace and Front Streets, has been made to the city board of commissioners.

✦

Jersey Shore, Pa.—The Jersey Shore Street Railway has informed the City Council that it will surrender its franchise to operate in the city if action is taken to compel it to carry out changes in its tracks on that part of the line in Allegheny Street which is slated for improvement.

✦

New Orleans, La.—Trackless trolley cars must pay a vehicle tax and drivers must carry chauffeurs' licenses, according to an opinion handed down by Attorney General Percy Saint in reply to the request for an opinion made by D. H. Clark, chief enforcement officer of the Louisiana highway police. The opinion was requested on the operation of the new trackless trolley by the New Orleans Public Service, Inc. The ruling apparently hinges on whether the vehicle operates on self-contained power. Attorney General Saint ruled that it did.

✦

San Francisco, Cal.—Investigation of the depreciation fund of the Municipal Railway and a comparison with the similar fund of the Market Street Railway is to be undertaken by the public utilities committee of the Board of Supervisors. A request of the Market Street Railway for an increase in the car-hour charge for power furnished the Municipal lines on lower Marker Street has been referred to the Board of Public Works.

✦

Pontiac, Mich.—No immediate action is planned by the City Commission on a request of the Eastern Michigan Railways for permission to charge an 8-cent fare rather than the present 7-cent city fare in Pontiac.

Philadelphia, Pa.—Stockholders of the Philadelphia Rapid Transit Company have elected Alexander Knox and Boyd Garbutt directors to succeed J. McCartney and N. H. Pettit. These two men, together with J. J. Haungs, constitute the employees' representatives on the board. Other directors were re-elected. The stockholders also approved a management fee of 2 per cent of Philadelphia Rapid Transit gross earnings to Mitten Management.

✦

Seattle, Wash.—An appropriation for double-tracking the Municipal Street Railway line on Eighth Avenue South, estimated to cost $37,452, asked of the City Council by Superintendent of Public Utilities Avery, has been taken under advisement by the Council utilities committee, pending a study of the whole improvement program and the financing plans involved.

✦

Michigan City, Ind.—Officials of the Chicago, South Shore & South Bend Railroad have filed papers with the secretary of state, certifying to a change in the number of directors to thirteen and to an increase in the capital stock by 10,000 shares of preferred having no par value.

✦

Trenton, N. J.—The Senate has passed a bill which would appropriate $375,000 from toll revenue as New Jersey's share in the construction of rails over the Camden-Philadelphia bridge. The measure now goes to the House of Assembly. Pennsylvania is also to contribute $375,000. Senator Richards pointed out that the original bond act for the construction of the span specifically designated that all revenues collected aside from maintenance and operation costs should be applied to retirement of the bonds. Senator Stewart and Senator Powell declared that the Bridge Commission intended to lay rails and that the action had only been deferred. Presumably both Philadelphia Rapid Transit and Public Service Coordinated Transport would be in a position to operate cars over the structure.

✦

Colorado Springs, Col.—The Myron Stratton Home Corporation, owners of the Colorado Springs & Interurban Railway, in its financial report for 1929, shows that the tramway was operated at a loss of $64,631. The company is substituting buses on some lines, and keeping the overhead at a minimum, hopeful that service will not have to be curtailed materially.

News Flashes for the Industry

To supplement the service of the regular monthly issues of ELECTRIC RAILWAY JOURNAL, a separate NEWS service appears on 39 Saturdays during the year. This supplement keeps you in touch with fare increases, court decisions, association meetings, financial and corporate news, equipment purchases, changes in personnel.

Read the

Electric Railway Journal

NEWS!

✦

Trenton, N. J.—Wage contracts for a three-year period have been entered into by the Trenton Transit Company and its employees. The present wage scale is to endure for three years. Platform men receive 61 cents an hour for the first three months and 63 cents hourly for the next nine months. After the initial year of service the rate becomes 65 cents an hour. Power house and other employees are also paid on a sliding scale.

✦

Oakland, Cal.—Alfred J. Lundberg, president of Key System Transit Company, and vice-chairman of the readjustment committee, announced on March 22 that subscriptions to new preferred stock under the company's reorganization plan to date total $3,682,875, or $182,875 more than necessary to insure payment of first mortgage bondholders. Deposits of first mortgage bonds now are more than 98 per cent of total outstanding; general and refunding more than 95 per cent; collateral trust notes more than 76 per cent; prior preferred stock more than 66 per cent; preferred stock more than 52 per cent, and common less than 1 per cent.

✦

Binghamton, N. Y.—A contest is being conducted by the Triple Cities Traction Company at the Binghamton Central High School for verses for car cards. For some time now, cards have been run in cars, the size of the regular advertising cards but placed in a rack—furnished by Collier—at the end of the car on the signal box. In the past the company has made its own copy, emphasizing safety, comfort, convenience, etc., but about the first of the year the company put in a four-line bit of poetry signed by a patron. That started something. Copy began to come in so that now the message is being changed every week and the poetry contest started.

✦

New York, N. Y.—On April 3, beginning at 10:30 a.m., the Department of Plants and Structures will offer for sale at public auction at the office of the department, Room 1800, Municipal Building, Borough of Manhattan, old structural steel trolley plates, gratings, columns, girders, steel trolley poles, rails, copper trolley wire, etc., now stored at the various locations mentioned in the advertisement and under the terms and conditions set forth in the *City Record*. This equipment was part of the property of the Manhattan Bridge Three-Cent Line, now no longer operated but replaced with a bus route.

✦

Philadelphia, Pa.—An ordinance to permit the Philadelphia Rapid Transit Company to operate the South Broad Street subway on its completion, April 20, has been sent to the Council by Mayor Mackey. The ordinance also authorizes the Mayor to negotiate a new lease with P.R.T. for operation of the entire Broad Street subway, subject to approval by the Council. The P.R.T. is at present operating the Broad Street subway under a "gentlemen's agreement," under which it is retaining all of the subway receipts pending a permanent agreement. On negotiation of the latter its provisions as to rental will be retroactive to the date of the "gentlemen's agreement," effective, Dec. 1, 1928.

Roanoke's Circulating Sales Manager

Since August, 1929, the Roanoke Railway & Electric Company has employed a sales manager and public relations man whose labors are both diversified and unusual.

One of his primary jobs is to ride the cars and buses to observe the operating habits of the men, the appearance of the vehicle and the attitude of the patrons. In this respect, his work is not unusual, but his ways of correcting any difficulties found are out of the ordinary.

Instead of passing on his findings for action by C. B. Short the general manager, the sales manager is authorized to try personal instruction or persuasion first. As an expert in equipment, he discusses and demonstrates correct starting and stopping with the man at fault, and emphasizes what correct handling of equipment means in the easier sale of the ride. Uneven starting, overmuch running in second, and rough and excessive braking are all shown to be avoidable.



Meticulously Garbed Men Who Sell the Service in Roanoke

All this is handled in good humor, and not even the superintendent of transportation would be notified unless indifference should be shown after several attempts to cure.

In like manner, equipment annoyances like soiled ceilings or shabby upholstery are passed on to the shop superintendent for correction.

In discussing the work of this official, Mr. Short said that success of the job depended almost entirely on starting with the right type of man. The Roanoke man is a native of the city who started as a policeman, then made good as a plain clothes man, was an automobile salesman for eight years, then changed to the jobs of Pullman conductor and dining-car steward in turn. Here is a man who knows how to cater to the whims of the public, and to deal with the infirmities of operating men and transportation equipment. It took some time to find the right combination, but the results indicate that there is a market for the ride salesman.

A Cordial Welcome to the Pacific Coast

Routine matters were the principal subject of discussion at a meeting of the executive committee of the American Electric Railway Association held in New York on March 21. Reports of various committees and of the managing director and the general secretary were presented. Plans for the 49th annual convention were considered and a vote of thanks tendered to Labert St. Clair for his work in preparing an attractive booklet in conjunction with the committee on transportation. Recent legislative developments in Washington were outlined by Leslie Vickers. Changes in the method of selecting winners in the Brady Safety Award Contest were announced. In behalf of the California Electric Railway Association, G. J. Kuhrts, president Los Angeles Railway, assured those present a cordial welcome on the Pacific coast next June.

Jurisdiction of Court in Louisville Fare Case Upheld

The United States Court of Appeals at Cincinnati, Ohio, on March 22 upheld the decision of the Western Kentucky District Federal Court, at Louisville, Charles I. Dawson, judge, in the 10-cent cash fare case of the Louisville Railway against the city of Louisville. The decision at Cincinnati affirmed jurisdiction of the United States District Court at Louisville, the city having contended that the federal court had no jurisdiction in the matter. A constitutional question was involved, and the company had endeavored to show that enforcement of a 7-cent fare would be confiscatory and in violation of the fourteenth amendment.

The decision will probably mean further trial in the local federal court on the merits of the case, as the matter of jurisdiction has been settled.

The district court in Louisville formally granted a temporary injunction to the railway last fall, preventing the city from interfering with the company in the matter of collecting a higher rate of fare. The city then went to the appellate court for a ruling on jurisdiction.

Decree of Foreclosure Entered Against New York State Railways

Foreclosure of mortgages covering the property of the New York State Railways, ordered by Federal Judge Bryant upon application of owners of mortgage bonds on which interest is in default, will become effective April 1.

Benjamin E. Tilton and Wallace E. Pierce, receivers, will continue in that capacity during the foreclosure, which Judge Bryant authorized on March 25 on application of the Security Trust Company, Rochester. The trust company is acting as trustee for owners of $16,457,000 in consolidated mortgage bonds on which interest was defaulted on Feb. 1 and $1,500,000 in other bonds. Judge Bryant also ordered a complete audit and survey to be made of the railways' property.

Indiana Merger Arguments Concluded

Arguments in the proposed $70,000,000 merger of Insull-controlled utilities in Indiana were concluded on March 21 before the Public Service Commission. The hearings were resumed on March 17, after a recess of nearly three months. Attorneys for the petitioning companies were given until April 5 to file a brief, and counsel representing objectors fifteen days after that. The commission will then take action on the petition of opposing attorneys for dismissal of the case on grounds that merger of gas, electric, water, ice and transportation utilities is unlawful and that the commission has no jurisdiction in the matter.

Wage Scale Renewed in Memphis

Trainmen of the Memphis Street Railway, Memphis, Tenn., have agreed to the renewal of the present wage scale for another year. In a letter addressed to E. W. Ford, vice-president of the railway, the operators said:

"We are not at this time agreeing to the present wage scale because we feel it is just or fair, but we are doing so as a matter of patriotic duty with the hope that at the expiration of twelve months, officials of the railway will be glad to show the same consideration towards our membership and agree to an increase commensurate with the cost of living, standard of living, services performed, and conditions under which the services are performed."

Selling Tickets from House to House in El Paso

An interesting experiment is now being made by the El Paso Electric Company, El Paso, Tex., in house-to-house selling of street car rides. F. L. Grissom has been selected as the operator-salesman and has been calling upon residents in Kern Place. Results of the experiment are encouraging but they do not cover a period long enough to make them conclusive. The outlook is promising, however, and should ticket sales warrant it, the plan will be extended to other sections.

Full- and half-fare tickets are sold in strips in any amount desired and the customer may buy for cash or on credit. The primary object is to sell full-fare tickets sufficient to permit two rides a day for a 30-day period. All sales are made at the regular rate of fare, but the opportunity to have these charged on the regular bill for electric service is an advantage that appeals to many patrons.

Through Limited Bus Service Suggested for Akron

The Northern Ohio Power & Light Company, Akron, Ohio, has submitted a suggestion to the Akron City Council that an experiment be made on the West Exchange Street bus lines looking toward a through limited service in an effort to speed up service.

In general, the plan is to provide limited service on the long-haul lines; i.e., after a bus makes the last regular stop in the downtown business area it will proceed to a certain outlying point without any intermediate stops. The intermediate section between the business area and the outlying point which will be the first stop of the limited bus is to be served by local buses making all stops. This system will give the long-haul passengers faster service without undue sacrifice on the part of the close-in riders. The company realizes that to deprive close-in riders of frequent headway will discourage short-haul riders, but it also realizes that to encourage long-haul riders it must make the service more attractive by getting riders to their destination in less time than is now required.

The suggestion is also based on the theory that most of the company's bus routes were established to render service to outlying territories which had no other transportation service and it was never intended that these bus routes should supplement or rather compete with the already established rail service. The attitude of the company is that when two or more lines are operated on the same street or on parallel streets through necessity on account of routing, the bus routes serving outlying districts should not be required to serve the intermediate territory also in competition with routes already established and capable of rendering adequate and sufficient service within the intermediate territory.

Wants Columbus Railway to Be Self-Sustaining

A reduction in electric current rates in Columbus, Ohio, hinges entirely on the allowance of an increase in car fare to 8 cents cash, five tickets for 35 cents, according to Benjamin W. Marr, president and general manager of the Columbus Railway, Power & Light Company. The City Council has asked that the company promise to reduce power rates when the higher fares become effective. Mr. Marr believes it will be possible to reduce power rates by fall.

Some time ago Mr. Marr announced that the fare will be increased, effective on April 5. Immediately, the City Council directed City Attorney Davies to block the proposed increase by injunction. The issue is complicated by the fact that the company is operating without a franchise. The position of the council is that no change in fares will be countenanced unless the company obligates itself to serve the city over a period of years. The present fare is 6 cents cash and five tickets for 25 cents.

Conspectus of Indexes for March, 1930

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years High	Last Five Years Low
Street Railway Fares* 1913 = 4.84	Mar., 1930 **7.94**	Feb., 1930 **7.87**	Mar., 1929 **7.75**	Mar., 1930 **7.94**	Mar., 1925 **7.26**
Electric Railway Materials* 1913 = 100	Mar., 1930 **141.6**	Feb., 1930 **142.9**	Mar., 1929 **144.8**	Dec., 1926 **159.2**	Feb., 1928 **139.5**
Electric Railway Wages* 1913 = 100	Mar., 1930 **231.7**	Feb., 1930 **231.7**	Mar., 1929 **230.1**	Feb., 1930 **231.7**	Mar., 1925 **221.5**
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	Mar., 1930 **203.0**	Feb., 1930 **203.6**	Mar., 1929 **203.4**	Nov., 1928 **205.7**	July, 1929 **199.0**
General Construction Cost Eng'g News-Record 1913 = 100	Mar., 1930 **206.8**	Feb., 1930 **206.5**	Mar., 1929 **207.8**	Jan., 1927 **211.5**	Nov., 1927 **202.0**
Wholesale Commodities U. S. Bur. Labor Stat. 1926 = 100	Feb., 1930 **92.1**	Jan., 1930 **93.4**	Feb., 1929 **96.7**	Nov., 1925 **104.5**	Feb., 1930 **92.1**
Wholesale Commodities Bradstreet 1913 = 9.21	Mar., 1930 **11.22**	Feb., 1930 **11.51**	Mar., 1929 **13.00**	Dec., 1925 **14.41**	Mar., 1930 **11.22**
Retail Food U. S. Bur. Labor Stat. 1913 = 100	Feb., 1930 **153.0**	Jan., 1930 **155.4**	Feb., 1929 **154.4**	Nov., 1925 **167.1**	April, 1925 **150.8**
Cost of Living Nat. Ind. Conf. Board 1914 = 100	Feb., 1930 **158.8**	Jan., 1930 **160.4**	Feb., 1929 **161.0**	Nov., 1925 **171.8**	Feb., 1930 **158.8**
Industrial Activity Elec. World, kw.-hr. 1923–25 = 100	Feb., 1930 **123.5**	Jan., 1930 **121.8**	Feb., 1929 **140.4**	Feb., 1929 **140.4**	Aug., 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	Feb., 1930 **96.5**	Jan., 1930 **95.2**	Feb., 1929 **110.1**	Oct., 1929 **111.8**	Nov., 1926 **94.0**
Business Failures Number	Feb., 1930 2150	Jan., 1930 2368	Feb., 1929 1737	July, 1929 1581	Sept., 1928 1348
Liabilities, Millions of Dollars	**69.13**	**78.55**	**62.15**	**102.09**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Wage Scale Renewed on New York State Lines

The New York State Railways and its employees in Rochester, Utica and Syracuse have reached an agreement on a wage and working contract for the coming year. At simultaneous meetings held in the three cities, the members of the Amalgamated Association voted to continue the present contract for the period of the receivership.

Benjamin E. Tilton and Wallace Pierce, appointed by Federal Judge Frederick H. Bryant as receivers of the railways in January, conducted the negotiations for the company.

The present wage scale calls for payment of 55 cents an hour for platform men on city two-man cars; 57 cents for interurban employees and 60 cents for one-man car operators.

It was provided that should the receivership be terminated within a year the contract will be carried over to April 1, 1931.

In other years negotiations have been prolonged and usually the contract was signed in May or June and made retroactive to April 1.

Wage Proposal Rejected in Oregon

Employees of the Pacific Northwest Public Service Company, Portland (formerly Portland Electric Power Company), have rejected the company's offer to split 50-50 with them any increase in gross revenues over the revenues of the year 1928 accruing to the company in the year 1930, as a result of the increase in fare recently made effective. Nearly a year ago members of the Amalgamated Association sought an increase of about 10 cents an hour for platform men and like increases for shop and track men, but the management stated that while it could not consider increasing wages under then existing conditions it would negotiate the question as soon as it might be granted an increase in fare, then pending before the Public Service Commission.

The present offer was rejected because it did not provide for any definite amount of relief. The management insists that it is too soon yet to estimate accurately the effect of the fare increase, but is willing to adopt this revenue-sharing plan as an expedient for the current year in lieu of a definite wage increase.

If an agreement is not reached by negotiation, the case will be arbitrated in accordance with existing arrangement.

Proposal for City Operation in Springfield, Ohio, Rejected

The City Commission, Springfield, Ohio, has denied the request of the Cincinnati & Lake Erie Railroad to take over and operate the Springfield Street Railway. The Commission held that the company's proposal was impractical. After turning down the company's proposal to operate the local service, the commission ordered it to cease and desist from operating freight trains through the city. Following action of the Commission in ending negotiations with the Cincinnati & Lake Erie company, the city began advertising for bids for a local transportation system which may include bus, electric lines or a combination of both. The bids will close on April 4.

Militant Policy Helps Indiana Interurban

During the first two months of 1930, the Indianapolis & Southeastern Railroad carried 15 per cent more passengers than in the corresponding period last year. Important improvements in service effected since the reorganization of the line in August, 1928, are largely accountable for this steady increase in patronage.

Within the last eighteen months, thirteen new one-man parlor type cars have been purchased and all passenger service on the railroad is now operated with this new and modern equipment. A bus connection from Greensburg, serving Batesville, Sunman, Manchester, Aurora, Lawrenceburg and Cincinnati, was put into effect a little more than a year ago and five round-trips daily are made on this line.

For the better handling of freight an additional freight motor car was equipped in 1929; twelve freight trailers were constructed in the company's shop and new stock pens were erected at Arlington for the shipment of live stock.

The main high-tension line has been rebuilt for more than 75 per cent of the entire distance and the trolley wire has been rehabilitated and reinforced. It is expected that by May 1 the entire overhead structure will have been gone over and put in first-class condition.

Where the old company gave approximately two-hour service, the new company is giving hourly service on both the Connersville and Greensburg divisions, and on the Greensburg division half-hour service in the forenoon and evening rush hours. A truck connection out of Greensburg has been established to give direct overnight service to Osgood, Versailles, New Point and Batesville.

On Sundays, a rate of one-way fare plus 10 cents for the round-trip, is in force. On Jan. 1 the company began giving patrons, after 4 p.m., from any agency station on the line to any other station, the privilege of buying a round-trip ticket for the regular one-way fare, good after 4 p.m. and returning the same evening.

Several months ago all live stock rates were materially reduced.

Once Overs By C. D. Batchelor



New York Evening Post.

Snapshooting the Millennium

"Madam, we are happy to welcome you as a patroness of our service. Just take your time, we are but your humble servants."

Pertinent Papers Read at Illinois Meeting

Of the four addresses delivered at the annual convention of the Illinois Electric Railway Association at Springfield, March 19, one dealt with the trolley bus, one with increasing interurban passenger revenue by reducing fares and one with Chicago's front entrance, center exit car. At an election of officers, Guy A. Richardson, Chicago Surface Lines, was elevated from vice-president to president, succeeding C. H. Jones, Chicago, South Shore & South Bend Railroad, Michigan City, Ind. R. B. MacDonald, Moline, Tri-City Railway, was made first vice-president and H. A. Johnson, Chicago Rapid Transit Company, second vice-president. George W. Schwaner, Springfield, was re-elected secretary-treasurer not only of the Electric Railway Association but also of the Illinois State Electric Association and the Illinois Gas Association which held their annual conventions in conjunction with the railway meeting.

F. G. Hamilton, Gary, Ind., of the Gary Railway, recited incidents where his company has made a large reduction in fares to increase passenger revenue. Among other things he said:

> Revenue dropped from $4,136 per month in 1924 to $1,767 per month during the first six months of 1928. It was at this point that it was decided to try a severe rate reduction in an attempt to retrieve the diminishing business. Nine cents, or 37.5 per cent, was sliced off the one-way fare between Gary and Indiana Harbor, rates being reduced from 24 cents to 15 cents.
>
> As a result traffic increased by leaps and bounds during the next few months. Whereas the average number of passengers carried per month during the six months previous was only 8,000, the average for the six months following the reduction jumped to 15,000. Average monthly revenue for the six months previous to July, 1928, was only $1,767, but following the 37.5 per cent fare reduction average monthly revenue increased to $1,986. The average monthly revenue for 1929 was $2,636, which compares with $4,136 in 1924, the best year, and $1,876 in 1928, the poorest revenue year.
>
> The one-way fare between Crown Point and Gary was reduced from 45 cents to 30 cents, a decrease of 33.3 per cent. Similar reductions averaging 39.6 per cent were put in effect to intermediate points. At the same time the improved road bed and the speedier equipment permitted a reduction of five minutes in running time between Gary and Crown Point. The old cars made the trip in 55 minutes, whereas the new cars made the trip in 50.
>
> Figures on revenue are not so encouraging as the figures on passenger traffic. Still, they seem to indicate that the new cars and low rates have arrested the decline of the past four years. The monthly average of $3,077 for 1929 is $50 under the monthly average for 1928. The average monthly revenue for the three months of 1929 previous to the change is $3,075, while for the eight months following it is $3,079.

W. C. Wheeler, engineer of equipment, Chicago Surface Lines, asserted in his address on "Chicago's Front Entrance, Center Exit Car," that "for congested city traffic where riding habit is such that interchange is frequent, it is possible to separate the entrance and exit too far, causing confusion by the people who must work through in a short distance. It is thought that this condition will remedy itself to a certain extent as the passengers become more accustomed to the cars," he said.

John B. O'Connell, assistant superintendent of transportation, Chicago Surface Lines, quoted from a table showing that the rides on public transportation systems in New York, with its population of more than 6,000,000, are more than five times per capita those of Lexington, with its population of 60,312. He said:

> It is obvious that the popular usage of automobiles is greater in the smaller cities. These cities do not have the traffic problems of the larger ones and it is possible for the private automobile to serve its owner more easily. To attract riders the public transportation vehicle must offer a very attractive service and must, therefore, approach the desirable features of the passenger automobile. This task is not altogether impossible since the factors of economy and elimination of the inconvenience of terminal facilities necessary for private automobile usage are in favor of the public transportation vehicle.

After describing in detail the construction of the overhead system in his address on "Solving the Overhead and Collection Problems of Trackless Trolley," Lee Birch, engineer transportation department, Ohio Brass Company, said:

> At the present time experiments are being conducted on a special device for making the swivel harp rigid at the will of the operator. Other experiments are being conducted on a "pull down" mechanism for lowering one trolley pole. Experiments are also being made on a ground shoe which will enable the coach to make negative contact with the street car rail. These three devices are being developed to permit a coach to operate with the positive wire and the track rail which is deemed necessary in some instances.

Chicago Co-ordination

Real progress is being made on Chicago's new transportation co-ordination ordinance, and the committee of bankers, heads of transportation companies and councilmen expected to fill in the missing financial sections by March 29, so that the ordinance can be submitted to the holders of the many different issues of securities embraced among the present outstanding obligations of the transportation companies. It is hoped that the Council will now pass the ordinance by April 15, and that the measure can be presented to the people at a special referendum on or about June 15. One of the most important steps recently taken toward this end came on March 20 when the local transportation committee of the Council adopted unanimously most of the recommendations on a financial set-up made by the committee of bankers, and allowed most of the points desired by the companies.

Eighteen Lines to Be Rerouted in Busy Brooklyn

During the next few weeks the Brooklyn & Queens Transit Corporation, Brooklyn, N. Y., will put into effect a plan for rerouting the various surface lines in the downtown Brooklyn area for the purpose of improving trolley operation and traffic movement.

To carry out the plan, decided in cooperation with the Brooklyn Borough President, the Police Commissioner, the Transit Commission and representatives of Brooklyn civic organizations, new curves, switches and special track work are being installed by the railway at a cost of approximately $100,000. The complete rerouting plan affects eighteen surface lines entering the downtown Brooklyn area and is designed to simplify the operation of surface cars by eliminating, wherever possible, crossings and left-hand turns.

The changes in surface car operation and traffic regulations are based on intensive study of the factors affecting the traffic situation in downtown Brooklyn in an effort to find some means of providing immediate relief for the existing congestion. In addition to spending $100,000 for changes in track layout, the Brooklyn & Queens Transit Corporation is purchasing 100 new cars, with modern equipment, such as to provide for rapid acceleration and retardation, at a cost of $1,600,000 to help speed up the movement of surface cars. All of the changes proposed are of an experimental character. The results of this experiment in the Borough Hall area will aid in the development of plans to improve trolley service and traffic movement in other sections.

Revere Beach Increase Authorized

The establishment of an exit fare in addition to the fare paid on boarding the train has been authorized by the Department of Public Utilities in permitting an increase between certain stations in the schedule of the Boston, Revere Beach & Lynn Railroad. The new schedule becomes effective May 4.

The company had filed a new schedule, in which it was proposed to increase the fare between stations in Lynn and stations in Boston and Winthrop from the present cash fare of 10 cents to 15 cents, providing, however, for the sale of twelve tickets for $1.50, thus establishing a 15-cent cash fare or a 12½-cent ticket fare.

The commission held that the proposed rates per mile of transportation are less than those charged by any railroad in the commonwealth. On this basis the commission held that the proposed rates were not unreasonable. The fare between Lynn and Revere is 10 cents. It is neither unreasonable nor unfair to require passengers riding from Lynn to Boston or Winthrop to pay an additional charge of 2½ cents, if tickets are used, or of 5 cents, if a cash fare is paid, for riding the extra distance from Revere to Boston or Winthrop. If by reason of the changed rates the company derives a revenue in excess of that necessary to maintain its credit, the commission directs that the excess be devoted to necessary repairs and to the improvement of the service.

Under the company's proposal, all persons leaving the stations at West Lynn and Lynn were to pay 5 cents, or present an exit coupon, in addition to the 10-cent cash fare already paid, and all persons entering those stations were to pay a 15-cent fare. Those passengers intending to leave the train within the 10-cent zone would obtain in the Lynn stations a redemption coupon entitling them to receive 5 cents at the station where they left the train. This plan the commission did not approve.

The commission also directed a change in the schedule to provide half-fare for students.

Disraeli Said:

"We all of us live too much in a circle. Nature is more powerful than education."

SEE NATURE—

DEVELOP YOUR EDUCATION

by

Attending the

49th A.E.R.A. Convention

at

San Francisco, Cal.

June 23 to 26 inclusive

THE GOLDEN WEST IN JUNE IS NATURE AT HER BEST

Free Shoe Shines for London Subway Passengers

Two automatic shoe-cleaning machines have been installed at Morden station, the south London suburban terminus of the Underground Railway, and passengers may now polish their shoes free of cost. If a traveller is not satisfied with the first operation of the brush, he may give repeat orders to the machine, and there is still no charge.

This innovation is due to the large quantities of mud which have been brought to the station and the railroad cars by laborers employed in the neighboring building estates in course of development. The machines have been placed between the ticket barrier and the platform. If the experiment proves successful the Underground may install similar machines at other London subway stations in areas where building estates are being developed or where many laborers patronize the subway.



Passenger's shoes are polished for nothing at this London station

New Omaha Rerouting Acclaimed

During the first week of the latest rerouting of the Omaha & Council Bluffs Street Railway, which went into effect on March 2, not one complaint was registered in contrast to the many received during the original rerouting, put into effect on Dec. 8.

Under the latest rerouting there has been a drop of 25 per cent in the number of transfers issued, compared to the first rerouting program, indicating that the desired result of taking the largest possible number of commuters directly from their homes to their work is being achieved.

The new system requires 114 "base cars" as against 108 on the first rerouting and 112 on the original system. The bus system, consisting of seventeen buses, has not been changed. It met with immediate approval.

The new routing was made easier by the fact that power from three new substations was available for the change. One more new power substation is now in the process of construction.

An effective good-will gesture on the part of the company was the running of page advertisements in the Omaha newspapers the evening of the first business day the new system was in effect, with large headlines which read "Thank You For Your Co-operation." Extracts from the advertisement read:

> The people who were inconvenienced by the rerouting seemed to remember that we, too, are just human beings doing the best we can. It is therefore natural that our relations with our patrons be friendly. . . . We want to thank all the car riders for their friendly co-operation with us in making the routing changes. We are confident that this co-operation will continue. . . . It will be a few days before all the lines and schedules work smoothly. Time and energy mean nothing to us in bringing about this desired result.

Harvard Award to Westinghouse

The Harvard Award, for the "general or institutional advertising campaign conspicuous for the excellence of its planning and execution," established by the late Edward W. Bok, has been presented to the Westinghouse Electric & Manufacturing Company. It is the first made to a national institutional advertising campaign in newspapers since the founding of the event.

The award was established in 1923 in the belief that recognition of this kind would stimulate excellence in the planning and execution of advertising. It also would afford, the founder stated, an educational opportunity through the focussing of public attention upon advertising of excellence and provide a means to encourage advertising workers through public recognition of their work.

The Westinghouse advertisements consisted of a series of twenty announcements, nearly all of which were a full newspaper page in size. They appeared in the leading newspapers of the United States and for the most part were included in rotogravure sections.

The advertisements told, in simple terms, of the great service electricity is rendering today's world—in industry, in transportation, in home, in office. They were "institutionalized" by citing the important contributions made by Westinghouse in expanding the uses of electricity.

The series was part of a Westinghouse newspaper advertising campaign which had its inception in 1928.

PERSONAL MENTION

Guy A. Richardson Heads Illinois Association

Vice-President and General Manager of Chicago Surface Lines Honored by Election to Important Sectional Association Post

GUY A. RICHARDSON, vice-president and general manager of the Chicago Surface Lines, was elected president of the Illinois Electric Railway Association at the recent meeting of that body in Springfield. Thus another association activity is added by this executive, never too busy to render aid in the councils of the industry with which he has so long been identified. Few executives have larger responsibilities than he, yet he has always given freely of his time to work of this kind, more recently as a member of the policy and the membership committees of the American Electric Railway Association and at present as second vice-president of that body.



Guy A. Richardson

Guy Richardson has had a wide experience in railway operation. He first attracted national attention by his work at Seattle, Wash., in which city he rose from the post of assistant superintendent of the Seattle Electric Company to superintendent, only to be drafted by the U. S. Shipping Board. But that is getting a little ahead of the story. For the sake of sequence it would perhaps be better to stick to the strictly chronological order.

Born in Boston, Mass., in 1882, Mr. Richardson secured his education in the public schools of that city and of Newton, Mass., and was graduated from the Mechanic Arts High School in 1900, later taking a postgraduate course in machine shop work and mechanical drafting. In 1901 he entered the service of the Boston Elevated Railway with the status of an apprentice and an understanding that his education was to include training in a number of the company's departments. In this capacity he worked in the shops, power stations and on the cars as motorman.

During the summer of 1903 he was transferred to the electrical engineering department and remained there until September, 1904, when he accepted a position with the Boston & Northern Street Railway as inspector of car repairs. In May, 1905, he went with Stone & Webster and was assigned to the Houghton County Traction Company, in the copper country of the Michigan peninsula, as assistant superintendent. On Nov. 1, 1906, he was promoted to the position of superintendent of the property.

Prior to Mr. Richardson's advent on the job at Houghton it was the custom for the line to be snow-bound for weeks at a time with little more than a perfunctory effort to keep it clear. Mr. Richardson interpreted it to be his job to keep the line open, which he succeeded in doing. And anyone who knows what the snows are in the Michigan copper country realizes the prodigious task that confronted Mr. Richardson.

In January, 1910, Mr. Richardson was transferred to Seattle, as assistant superintendent of transportation, and by the end of the year had been made superintendent of that department. In a hair-trigger situation as regards public relations, the new superintendent acquitted himself in a manner that won the respect of a hypercritical city administration and did much to restore the property to public esteem. During the war period Mr. Richardson was drafted by the shipping board to assist in layout out a transportation system to serve the Hog Island ship yard, near Philadelphia. Other work of a consulting capacity at about this period included surveys for the Brooklyn Rapid Transit Company and the Chicago Elevated Railways.

When the property of the Seattle Electric Company was acquired by the municipality, although he received flattering offers from the then Mayor of the city, Ole Hanson, to stay and run the job, Mr. Richardson chose to try his fortune elsewhere and accepted a position as superintendent of transportation with the Philadelphia Rapid Transit Company. With that company he rose rapidly to the position of vice-president in charge of transportation, but resigned in October, 1922, and shortly afterwards went with the Chicago Surface Lines, with which property, as stated before, he now fills the position of vice-president and general manager.

✦

Thomas A. McConnell, for seven years assistant manager of the Yellow Cab, Inc., Newark, N. J., has been appointed acting manager of the Yellow Cab Division of Public Service Co-ordinated Transport, operating electric railway and bus lines. Mr. McConnell and his staff will have their headquarters in Public Service Terminal, Newark.

W. A. Robertson in Fort Worth Post

W. A. Robertson, recently appointed general superintendent of the Northern Texas Traction Company, Fort Worth, Tex., has been connected with Stone & Webster properties since 1910. Before going to Fort Worth he was connected with the Jacksonville Traction Company for more than four years, having been made general superintendent of that Florida property in June, 1924.

Mr. Robertson was born in Gallatin, Tenn., in 1889. After completing his education in the schools of that state he moved to Houston, Tex. His first business connection was with the Southern Pacific Railroad in the stores department as general clerk and price clerk. He served in these capacities from January, 1909, to Aug. 1, 1910. On leaving the Southern Pacific Railroad he went to work for the Houston Electric Company in the accounting department, and has been connected with Stone & Webster properties since August, 1910. Mr. Robertson worked in various capacities for the Houston Electric Company until June, 1920, at which time he was transferred to the Galveston-Houston Electric Railway as superintendent of transportation of its interurban line between Houston and Galveston. On Jan. 1, 1921, he was made superintendent of railways of the Eastern Texas Electric Company, Beaumont, Tex.



W. A. Robertson

As stated previously he was transferred to Jacksonville, Fla., in June, 1924, as general superintendent of the Jacksonville Traction Company and from that company after more than four years he was transferred to Fort Worth, Tex., where his work has to do with a system of about 200 miles of railway.

✦

D. E. Watson Heads Terre-Haute-Indianapolis System

David E. Watson, Indianapolis, was elected president of the Terre Haute, Indianapolis & Eastern Traction Company at a special meeting of the board of directors. He takes the place left vacant by the death of Robert I. Todd. Mr. Watson assumed his new duties immediately. He has been general attorney for the company for some years and has had charge of all legal matters connected with the merger now under consideration. He will continue to supervise the company's legal business. L. T. Hixson was re-elected vice-president of the company.

Peter Witt in New Cleveland Post

Accepts Five-Year Contract as Consultant to Van Sweringens, Now Engaged in Co-ordinating Street Railway and Rapid Transit Services

PETER WITT, street railway consultant and former street railway commissioner at Cleveland, Ohio, has accepted a five-year contract as consultant for Metropolitan Utilities, Inc., the Van Sweringen company which controls the Cleveland Railway under a voting trust arrangement, and also controls the Cleveland Interurban Railway, the Van Sweringens' Shaker Heights rapid transit lines, and Rapid Transit, Inc., the company which will control other Van Sweringen rapid transit lines radiating along railroad rights-of-way from the new Cleveland union terminal.

The contract was negotiated by George



Peter Witt

D. McGwinn, vice-president of the Cleveland Union Terminals Company. On two occasions in the past few weeks, Mr. Witt declined the job of consultant, but he was finally persuaded to accept the post because he felt he would have an opportunity to assist in the creation of the co-ordinated transportation system in Greater Cleveland. Mr. Witt said:

"I was informed by Mr. McGwinn that the people back of him are going to do everything possible to give the car riders what they are entitled to. Since they approached it in that light, I concluded it was a real opportunity. I will consult with Metropolitan Utilities officials, and also offer my own proposals."

Mr. Witt was railway commissioner of Cleveland from 1912 to 1916 during the regime of former Mayor Newton D. Baker. After leaving the commissioner's office, Mr. Witt took up consulting work, giving advice on railway problems in Seattle, Boston, Philadelphia, Toronto and other cities. He also developed the Peter Witt type of street car.

During the period from 1924 to 1928 Mr. Witt was a member of the Cleveland City Council, which, under the Tayler grant, has sole authority over railway operations. The Republican-Democratic coalition which controlled the Council declined, however, to heed Mr. Witt's proposals on railway matters. Oddly enough, one of the reasons Mr. Witt ran for the Council was to try and block the union terminal project. He was one of the original proponents of the plan to have the union station built on the lake front.

The fact that Mr. Witt is to advise the Van Sweringens not only on the co-ordination of rapid transit and street railway services, but also on the operations of the Cleveland Railway, is regarded as an indication that the Van Sweringens are of the opinion that the Tayler grant is no longer an effective plan for operations, so far as placing control of operations in the hands of the city is concerned.

As he started on his new job, Mr. Witt pointed out that the entire Cleveland Railway system is now carrying no more passengers than it did in 1914. He quoted figures and then added:

"These figures show that the remedy thus far applied, increasing the rate of fare, is worse than the disease. If the potential car rider is to be captured the rate of fare for the man who rides 8 blocks must be made considerably less than for one who rides 8 miles."

Peter Witt is acknowledged to be one of Cleveland's most picturesque public figures. At 60, his hair is black, with hardly a trace of gray. His figure is slender and tall, and his manner is bitter and sarcastic in public criticism from the platform, but mild and benign in private. He began life as a molder, single taxer and a Socialist street corner orator and was won over by Tom Johnson (whom he had been attacking). He was a tax expert and city clerk under Johnson; as mentioned previously, under Mayor Newton D. Baker he was railway commissioner.

✦

L. B. Herrington Heads Lexington Company

Announcement was made on March 22 at Lexington, Ky., by J. P. Pope, vice-president of the Lexington Utilities Company, owner of the Kentucky Traction & Terminal Company, that L. B. Herrington, president of the Kentucky Utilities Company, Louisville, had been elected president of the company, controlled by the Kentucky Securities Corporation, which was recently bought by Middle West Utilities Company from International. Included in the Lexington Utilities Company is the Consolidated Coach Corporation.

The Lexington Utilities Company operates the railway, power and other services in Lexington and through its subsidiary, the Kentucky Traction & Terminal, the interurban lines to Frankfort, Paris and other points.

Mr. Herrington succeeds P. M. Chandler, New York, as president. Martin and Samuel Insull, G. T. Bogard and A. A. Tuttle, Louisville, are new members of the board of Lexington Utilities. Mr. Pope and Thomas A. Combs, of Lexington, are hold-over members. Mr. Chandler, F. W. Bacon, R. P. Buell, New York; H. A. Loeb and H. P. Clark, Philadelphia, have retired from the board. Mr. Bogard of Kentucky Utilities becomes vice-president; Mr. Tuttle, treasurer; G. C. Jones, secretary treasurer; Miss Ollie B. Pherigo and L. W. Haley are to be assistant treasurers.

T. H. Steffens Heads Oklahoma Association

At the Oklahoma Utilities Association convention, held in Tulsa, March 11, 12 and 13, T. H. Steffens, president of the Sand Springs Railway, was elected president of the association. Prior to this he served as vice-president of the state utility body.

In addition to being president of the Sand Springs Railway Mr. Steffens is a director in a number of industrial enterprises. He is deeply interested in civic affairs and is a member of the Rotary, Optimist, Tulsa Traffic and Tulsa Athletic clubs. Tulsa Chamber of Commerce, vice-president of the Tulsa State Fair, and is a Shriner and a trustee of the Sand Springs Home.

Mr. Steffens was born in St. Louis, Mo., on March 1, 1883. There he was educated and there he entered the service of the Frisco Railway in 1900, where he was employed until May, 1911. He then became associated with the late Charles Page and went to Oklahoma in connection with the



T. H. Steffens

building and operating of the Sand Springs Railway, between Sand Springs and Tulsa. This property has grown from a 7-mile single track to a double-track line with an industrial trackage of 30 miles serving approximately 80 industries and distributing houses. The line was constructed in a virgin territory with no outstanding industries.

✦

Henry B. Wood Assumes Broader Duties

Henry Blake Wood has been appointed chief electrical engineer of the Stone & Webster Engineering Corporation, Boston, Mass. Mr. Wood was graduated in 1896 from the electrical engineering course at Purdue University. After four years in the testing and switchboard engineering departments at the Schenectady works of the General Electric Company he was assigned to the Boston office of that company in switchboard sales and engineering activities.

In 1917 Mr. Wood entered the Stone & Webster Engineering Corporation's organization as engineer in the electrical division, and in the summer of 1926 was made assistant to the chief electrical engineer. His work has embraced a wide variety of public utility and industrial undertakings, including a hydro-electric investigation in Japan in 1928 and numerous engineering jobs in continental United States.

New Officers for Reorganized Indiana Road

Raymond R. Smith, formerly vice-president and general manager of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railways, later receiver for the two lines, has been elected president of the new Northern Indiana Railway, Inc., which will take over these properties.

Mr. Smith, as receiver for the lines, conveyed the title to the new company and this marked practically the end of the period of involved legal technicalities which have been in progress for months.

In accordance with a policy of placing the lines as far as possible under local control, three other South Bend men were elected to important posts.

George R. Green, general superintendent of the lines as formerly organized, was made general manager of the new company.

Harry Weir, local attorney, was made vice-president and general counsel.

Oren A. Small, former secretary of the old lines, was made secretary and treasurer under the reorganization plan.

Alfred E. Dieterich, New York City, whose father, the late C. F. Dieterich, was president of the lines as formerly constituted, was elected chairman of the board of directors.

Mr. Smith, in addition to being president, was chosen chairman of the executive committee.

No change in the rest of the official personnel of the lines is contemplated.

The new directors are as follows: A. E. Dieterich, New York City, chairman of the board; R. R. Smith, South Bend, Ind.; Amos H. Plumb, Emporia, Kan.; Alva L. Kitselman, Muncie, Ind.; Harry R. Wair, South Bend, Ind.; William Carnegie Ewen, New York City, and one vacancy to be filled later.

The executive committee is to be R. R. Smith, chairman, and Alva L. Kitselman and Harry R. Wair.

The terms of the reorganization of the company were made the subject of a detailed study in the ELECTRIC RAILWAY JOURNAL for March, 1930, page 168, at which time they were also the subject of editorial comment.

✦

C. L. Seavey Heads California Commission

Clyde L. Seavey was recently elected president of the California Railroad Commission for 1930, in conformity with the policy followed by the commission in recent years of rotating the presidency among its members for a one-year term.

Commissioner Seavey succeeds Commissioner Thomas S. Louttit as the presiding officer of the commission, who held that position during 1929. He has served on the commission since Jan. 1, 1923, having been reappointed by Governor C. C. Young on Jan. 1, 1929. He served as president of the commission in 1923 and 1924.

Prior to his appointment to the Railroad Commission President Seavey served as city manager of Sacramento. Before accepting that appointment, he had been connected with the state government for many years as member of the state board of examiners, state board of control, state tax commission, state civil service commission, as well as in other special capacities of importance. Mr. Seavey is a Republican. He was born at Dixon, Ill.

✦

H. R. Frederick, for the last two years assistant manager of the Steubenville, East Liverpool & Beaver Valley Traction Company, Steubenville, Ohio, which operates between Beaver, Pa., and Steubenville, has been named general manager. He succeeds C. A. Smith, who has been elected president. Mr. Frederick has been associated with the company for eight years. He was engineer in charge of maintenance of way for six years. Prior to that he was a civil engineer for the Pennsylvania Railroad.

A. Stuart Pratt Retires

A. Stuart Pratt, vice-president of the Stone & Webster Service Corporation, Boston, has resigned, following many years of executive responsibility in the management of utilities with which this house is associated. His long and distinguished service in the supervision of the power companies at Cape Breton, Lowell, Brockton and Abington, Mass., was recognized some years ago by his promotion to the vice-presidency of the centralized management organization at Boston. He now retires to be freed from some of the exactions of business life. He is one of the best-known and most highly regarded executives in the Stone & Webster organization.

✦

Morse DellPlain Honored for His Utility Leadership



Morse DellPlain

Morse DellPlain, Hammond, Ind., was honored at a testimonial banquet at the Union League Club in Chicago on March 15 in recognition of his leadership in public utilities. Mr. DellPlain is now president of the Northern Indiana Public Service Company, vice-president of the Midland United Company, vice-president of the Chicago, South Shore & South Bend Railroad, and president of the newly organized Calumet Railways, Inc., which proposes to rehabilitate the Hammond, Whiting and East Chicago railway lines.

Mr. DellPlain has rapidly made a name for himself in and about Chicago by his able handling of utility problems and the versatility he has displayed in the discharge of his duties, explained in part by the range of his previous experience. He was born in New Orleans, La., in September, 1880. Most of his early life was passed in the Republic of Mexico. From 1890 to 1896 he was employed by the Central & South American Telegraph Company as an operator on the Isthmus of Tehuantepec. He later took up the electrical engineering course at Syracuse University.

In 1903 to 1905 he was an apprentice in the shops of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., and worked for the company as sales engineer in the Syracuse, N. Y., office from 1905 to 1909. He became power engineer for the Syracuse Lighting Company in February, 1909, and on Jan. 1, 1918, was appointed sales manager for that company. This position he resigned to become vice-president and general manager of the Northern Indiana Gas & Electric Company, predecessor of the Northern Indiana Public Service Company at Hammond, Ind. Mr. DellPlain is a member of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers. He is also a member of the Illinois Athletic Club and the Collegiate Club of Chicago.

✦

Joe Brennan New Carhouse Superintendent at Cincinnati

Joe Brennan has stepped up another rung on the ladder of promotion with the Cincinnati Street Railway, Cincinnati, Ohio, which has taken him away from Eighth Street division. Joe is now superintendent of carhouses, succeeding the late Walter Lee Frazier. Mr. Brennan began his street railway experience with the company at Cincinnati as a hill boy in 1895. Two years later he became a mechanic in the Clifton-Elm carhouse and was promoted a few years later to the position of night foreman in that division. In 1901, he transferred to Brighton carhouse, taking the position of day foreman there. In 1905, he took the same position in the Avenue carhouse, and in 1921 he went to Eighth Street, where he served as foreman up to his present promotion.

✦

A. F. Townsend, manager of the Northern Texas Traction Company, the Northern Texas Electric Company and the Tarrant County Traction Company, Fort Worth, Tex., has been elected president of these three firms, replacing George H. Clifford, Boston, now president of the Stone & Webster Service Corporation. Mr. Townsend will continue as manager of the three Stone & Webster subsidiaries located at Fort Worth. Amatus A. Chamberlain, treasurer of the Northern Texas Traction Company and Tarrant County Traction Company, was named treasurer and assistant secretary of those companies. The Northern Texas Electric Company is the parent company of the Texas Motor Coaches, Northern Texas Traction Company and the Tarrant County Traction Company, the latter operating the Fort Worth-Cleburne interurban line.

C. D. Emmons Resigns as President at Baltimore

C. D. Emmons, for eleven years president of the United Railways & Electric Company, Baltimore, Md., resigned on March 26. His resignation was accepted after the board had passed resolutions expressing their appreciation of his service. Lucius S. Storrs, executive chairman, was elected to succeed him. Mr. Storrs will continue as chairman as well as discharging the duties of the president of the company. Mr. Emmons announced that he would establish an office as an engineering consultant in New York. It was indicated that he would specialize in public utilities. He planned to sail from New York on March 29 on the *Minnetonka* for a short visit in Europe.

✦

Mr. Maltbie to Finish Philadelphia Work

Appointment of Dr. Milo R. Maltbie as chairman of the New York Public Service Commission is not expected to interfere with completion of his work in connection with the audit of the Philadelphia Rapid Transit Company's books. Mr. Maltbie was selected as Comptroller Hadley's representative at a conference of experts before President Judge Harry S. McDevitt of the Common Pleas Court, where a reorganization of the relations between the city and the company is under consideration. Other experts are drawing up separate recommendations for the Mayor, the City Council and the company.

✦

"Bert" Sanders Leaves Kansas City Public Service

E. B. Sanders, for ten years in charge of the commercial department of the Kansas City Public Service Company, Kansas City, Mo., has resigned to open an advertising agency in Cleveland, Ohio, as representative of the Barron's Advertising Company. He is succeeded at Kansas City by A. H. Wood, son of B. F. Wood of Stevens & Wood, Inc., New York City. Mr. Wood has been a cadet engineer with the Public Service Corporation of New Jersey. Before that he was with Barron Collier, Inc., in New York. "Bert" Sanders, as he is familarly known, has long been connected with newspaper and advertising activities, his apprenticeship including intensive training under Henry J. Allen, former Governor of Kansas, known as one of the most expert mentors and appraisers of newspaper talent in the United States. The work of few men in the public relations field with utilities has attracted more favorable attention than has that done by Mr. Sanders.

✦

E. R. Norris has been appointed assistant to the vice-president according to an announcement issued by J. S. Tritle, vice-president in charge of manufacturing of the Westinghouse Electric & Manufacturing Company. Mr. Norris, formerly general works manager, will now be responsible for all plant facilities of the company, manufacturing methods, cost reduction and inspection. Mr. Norris has been associated with the Westinghouse company since 1892.



John B. O'Connell

John B. O'Connell in New Chicago Post

On March 1, John B. O'Connell became assistant superintendent of transportation for the Chicago Surface Lines, succeeding M. B. Quinn, who has been assigned to public speaking and trainmen instruction.

Mr. O'Connell was first employed by the Surface Lines in 1915 as a substation helper. During that time he was a student at the Armour Institute of Technology. He enlisted in the United States Navy in 1917 for the period of the war, serving as chief electrician. After leaving the navy, he worked for a short time as a journeyman electrician and then went to sea again as a licensed engineer officer, retiring from this service in 1920 when his ship, "Snug Harbor," was wrecked off Block Island.

He entered the University of Illinois and took a course in electrical engineering and electric railway engineering, graduating in 1923. Following a brief employment with the electrical department of the Pennsylvania Railroad and with the Public Service Company of Northern Illinois, he returned to the Chicago Surface Lines as a cadet engineer. After being connected with several departments, he was made division superintendent of North Avenue, the largest division of the Surface Lines, in 1927. Last April, he was appointed assistant to E. J. McIlraith, staff engineer, and served in that capacity until his appointment as assistant superintendent of transportation.

Mr. Quinn has been with the Surface Lines 43 years, serving in all capacities in the transportation department, including the posts of division superintendent and assistant superintendent of transportation. In recent years, he has been closely identified with the Speakers Bureau work and the training of trainmen, to which he now devotes all his time.

✦

Duties of A. P. Gale Widened

A. P. Gale, for nearly four years manager of the Beloit division of the Wisconsin Power & Light Company, with headquarters in Beloit, has been transferred to Fond du Lac, and promoted to the management of the entire eastern division of the organization. He will have charge of the districts of Sheboygan, Fond du Lac, Oshkosh and Clintonville, together with all the bus and railway systems operated by the company excepting the bus line at Janesville. He will be in charge of the $6,000,000 development program at Sheboygan. Mr. Gale will be succeeded as manager of the Beloit division by James G. Allen, who has been manager of the Lake Geneva division which has been consolidated with the Beloit division.

✦

J. W. Rich, general manager of the Mount Vernon, Alexandria & Washington Railway, Washington, D. C., has resigned, his resignation to take effect May 1, 1930. He has been connected with this property and its predecessor, the Washington-Virginia Railway, as division superintendent, general superintendent and general manager, for the past 22 years.

OBITUARY

E. F. Peck

E. F. Peck, long connected with the engineering and management firm of Peck, Shannahan & Cherry, and its predecessor, Allen & Peck, Inc., is dead. Mr. Peck had not been active in utility work since 1921 when he was run down by an automobile and injured, but he was active in that field, very active, for many years, the years of the formative stages of the industry, in which he played a conspicuous part.

To electric railway men, he is perhaps best known as a member of the firms previously mentioned, as an officer of the Schenectady Railway, and as an associate of John N. Shannahan in the work of rehabilitating the railway property at Hampton, Va. To men in the light and power field, he is perhaps best known as a pioneer Thomson-Houston man, an officer of the Citizen's Electric Illuminating Company, and the Kings County Electric Light & Power Company, Brooklyn, N. Y., now both included in the system of the Brooklyn Edison Company, Inc., and as an officer of the Schenectady Illuminating Company and the Mohawk Gas Company. Incidentally the credit is his indirectly for securing the financial co-operation of the late Charles A. Coffin in the Thomson-Houston Company, later succeeded by the General Electric Company.

Born in New Britain, Conn., in 1861, he entered the electrical field in 1880 with the American Electrical Company, New Britain, Conn. This company subsequently became the Thomson-Houston Company. Mr. Peck was one of the first electrical experts to be entrusted by this company to install its apparatus. Moreover, he was in charge of the Thomson-Houston Company's exhibit at the Franklin Institute Fair in 1884, the first exhibit devoted solely to electrical apparatus held in the United States. Afterward, he had charge of the exhibit of the same company at the World's Fair in New Orleans in 1884-1885. It was from the Thomson-Houston Company that Mr. Peck resigned in 1885 to become general manager of the Citizens' Electric Illuminating Company, Brooklyn, N. Y. He continued in this capacity until 1897,

when he entered the engineering and supply business in New York City under the firm name of the Peck Electrical Company.

In 1899 Mr. Peck was appointed general manager of the Kings County Electric Light & Power Company, Brooklyn, a position he held until 1902, when he was appointed general manager of the Schenectady Railway. As indicated before, at Schenectady he was an officer in both the Schenectady Illuminating Company and the Mohawk Gas Company in addition to being general manager of the railway, all being under General Electric control at that time. Later these companies passed to joint ownership by the New York Central Railroad, and the Delaware & Hudson Company, but Mr. Peck continued with them in active charge until 1912, when he resigned to devote his entire time to the interests of Allen & Peck, Inc. The following year, he was elected president of the Hagerstown & Frederick Railway, serving also at the same time and in after years as vice-president of the Newport News & Old Point Railway & Electric Company.

Among the cities in which Mr. Peck assisted in installing electric light plants in the early days of the industry are Boston, Fall River, Lynn and Haverhill, Mass., Columbus and Springfield, Ohio, St. Louis, Mo., and Brooklyn. His work for the Schenectady Railway also was conspicuous. Not only did he introduce many innovations in the operation of the local city lines, but he made the company's interurban between Schenectady and Albany one of the outstanding lines of its kind in the East.

When Peck, Shannahan & Cherry was organized, Mr. Peck brought to it just that leaven of matured judgment and experience needed to balance the work of the younger men, fired with enthusiasm for accomplishment in a field in which it is not by any means so easy to score an outstanding success. One of the offices which Mr. Peck filled outside the direct line of his managerial work was that of president of the New York Electric Railway Association in 1909-1910. He had long been a member of the American Institute of Electrical Engineers.

✦

Alexander L. Black

Alexander Leslie Black, a vice-president of Ford, Bacon & Davis, and a vice-president of the Market Street Railway, San Francisco, from 1916 to 1925, died at San Francisco on March 3 at the age of 60. Mr. Black had been vice-president of the New Orleans & Lake Ponchartrain Bridge Company. He joined the organization of Ford, Bacon & Davis, New York, N. Y., in 1912 as engineer in charge of their Southern properties. Mr. Black was born in New Orleans, La., in 1871. He attended private schools in New Orleans and New York and was graduated from the School of Mines, Columbia College, in 1890. He engaged in mining work in the West and Mexico for three years, and was employed for a few months as assistant engineer on the Topographical Survey of New Orleans. In 1894-1895 he had charge of the reconstruction for electric operation of the St. Charles Street Railroad, New Orleans, and remained with that company supervising operation and constructing extensions until 1901, when the New Orleans properties were consolidated. For a long while he was engineer for the New Orleans Railway & Light Company, controlling the New Orleans street railways and lighting properties.

✦

Peter Junkersfeld

Peter Junkersfeld, since 1922 a vice-president with the construction and engineering division of Stone & Webster, is dead. Starting from the humblest beginnings, a farm near Sadorus, Ill., he acquired his early education at the school in the vicinity of his home, and then entered the University of Illinois, from which institution he was graduated as Bachelor of Science.

In the fall of 1895 he established a connection which lasted for a period of 24 years, when he entered the employ of the Chicago Edison Company, now the Commonwealth Edison Company. From various capacities in power plant operation, he rose in the organization until in 1909 he became assistant vice-president, supervising contracting, engineering, construction and operating work.

After serving with distinction in the army during the World War he returned to the Commonwealth Edison Company, but only for a few months. In April, 1919, Stone & Webster engaged him as engineering manager in charge of the engineering department and as an executive of the division of construction and engineering. In February, 1922, he became a member of the firm of McClellan & Junkersfeld, Inc., engineers and constructors. Six years later his firm was merged with the division of construction and engineering of Stone & Webster and Mr. Junkersfeld became a vice-president.

✦

Joseph H. Bragdon

Joseph H. Bragdon, publishing director of *Textile World* and vice-president and general manager of the Bragdon, Lord & Nagle Company division of the McGraw-Hill Publishing Company, publishers of that paper, died suddenly of pneumonia on Feb. 19.

Mr. Bragdon was a member of the executive committee and of the board of directors of the McGraw-Hill Publishing Company. He was past president of the New York Business Publishers Association and a past president of the Associated Business Papers, the latter office being the highest honor which the business publishing profession can offer. At the time of his death he was a member of the board of governors of the Advertising Federation of America.

Mr. Bragdon was born in Melrose, Mass., on June 9, 1887. His father, Joseph H. Bragdon, founded *Textile Manufacturers Journal* in 1894. When the son graduated from Yale in 1911, he joined the staff of that publication. In 1915 he was active in a merger which joined *Textile Manufacturers Journal* and *Textile World Record* into one publication, *Textile World*.

✦

C. A. Kincade

C. A. Kincade, head of the electrical distribution department of the Kansas City Public Service Company, Kansas City, Mo., since 1918, died unexpectedly on March 14, from heart disease. Mr. Kincade was born on Jan. 2, 1877, in West Virginia. He entered the employ of the old Metropolitan Street Railway in Kansas City in 1900 as a gripman on the old Twelfth Street cable line. Three years later he was transferred to the electrical department as a substation operator and a year later became assistant to the electrical engineer. In 1907 he was placed in charge of all overhead and conduit construction and maintenance work and in 1918 became superintendent of electrical distribution.

✦

John Wernsdorfer, 80 years old, employed by the United Railways & Electric Company, Baltimore, Md., for 58 years, died on Feb. 20. He was pensioned about ten years ago, but continued to serve as vice-president of the United Railways Twenty-Five Year Club. Mr. Wernsdorfer started as a track walker, but advanced step by step to be foreman of the track construction department.

✦

Cecil R. Pillsbury, assistant treasurer of the General Steel Castings Corporation at Granite City, Ill., died at Philadelphia, Pa., on Feb. 19. Mr. Pillsbury was 53 years old. He started with the Commonwealth Steel Company as a checker at $2 a day sixteen years ago. He gradually advanced until he was made treasurer, a position he held when that company merged with the General Steel Castings Corporation last July.

✦

Jacob H. Maag, foreman of maintenance of way and structures of the Los Angeles Railway, Los Angeles, Cal., died in that city on Feb. 27, at the age of 71. Fifty years of his life had been spent in railroad construction work, and he was one of the eye-witnesses to the joining of the rails uniting San Francisco and Los Angeles by railroad on Sept. 5, 1876, at Lang Station, near Newhall, Cal. From 1882 to 1904 he was section foreman for the Southern Pacific Railroad and then he entered the employ of the Los Angeles Railway as foreman of maintenance of way and structures, a position which he held for nearly 26 years.

✦

Nathaniel C. Robbins, New York advertising sales representative of *Power*, a McGraw-Hill publication, and veteran of service with the Astor Battery in the Spanish-American War, died at Nyack, N. Y., on March 16, following an illness of three months. Mr. Robbins was graduated from Cornell University in 1894. In addition to his service with the Astor Battery, he was a widely known veteran of the Seventh Regiment, New York National Guard. At the close of his service in Cuba, Mr. Robbins became associated with the Hill Publishing Company, then publisher of *Power*. He had served that company and its successor, the McGraw-Hill Publishing Company, since 1900.

✦

Oliver B. Barrows, for more than 30 years St. Louis representative of the American Steel & Wire Company, died on Feb. 25. He was born in Janesville, Wis., in 1863. He was made St. Louis representative of the American Steel & Wire Company in 1900.

✦

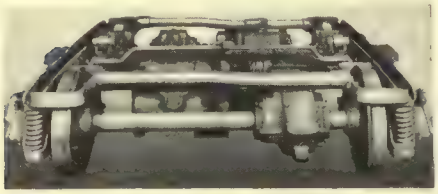
George Wright, chairman of the Toronto Hydro-Electric Commission, died at his home in Toronto, Ont., on March 17, in his 64th year. Mr. Wright was for many years a member of the Toronto Transportation Commission, operating the municipally-owned railway and bus system in Toronto. He was among the first of those in the province of Ontario who saw the possibilities of public development of hydro-electric power and light, and was closely associated with the late Sir Adam Beck in the early days of the enterprise.

Comfort and Speed on New Allegheny Valley Cars

By J. G. Inglis
General Engineering Department
Westinghouse Electric & Manufacturing Company

TWELVE new, high-speed, light-weight cars have completely modernized the rolling stock on the lines of the Allegheny Valley Street Railway, a subsidiary of the West Penn system.

The line runs parallel to the Allegheny River near the city of Pittsburgh, Pa. One branch extends upstream from New Kensington to Natrona, approximately 7 miles; the other extends downstream to Aspinwall, 11.73 miles. Service on the upper branch was formerly provided by six cars operating on a 15-minute headway with a 90-minute round-trip time. Two extra cars were operated in the rush hours, as the community is an industrial center.



Ample clearance under motor and gear unit is provided with 22-in. wheels

On the lower branch to Aspinwall four cars operated on a 30-minute headway with a round-trip time of two hours. No extra rush-hour service was necessary on this branch.

In considering modern equipment to replace the old cars, several refinements were necessary to meet the ideas of the company's engineers. One-man car operation was to be instituted, a low car floor was desired, and the running time on the Aspinwall line was to be cut 25 per cent, also the car weight was to be held to a point so that satisfactory operation could be obtained with 35-hp. motors.

Complete but without load, the new cars weigh 32,100 lb., have quadruple 1425-A motors (35 hp., 300 volt) geared 4.75:1 with WN drive to 22-in. wheels. The control is double-end K-75 with TA handle switches and lightweight Type M resistor. The free running speed of the new cars is 43.5 m.p.h., approximately 10 m.p.h. faster than the old ones. Seating capacity has been provided for 48 passengers, with well-upholstered, reversible seats finished in Spanish brown leather. Wide windows, narrow sashes, good lighting and an unobstructed view at the front of the car have been combined to make the ride of the passenger as pleasant as possible.

The mounting of the motors and WN drive as well as some of the features of the truck construction are of especial interest. The trucks are the Cincinnati Car Corporation's cantilever type with certain modifications to care for WN drive. A transverse tubular motor support carries one-half of the motor weight, while the other half of the motor weight and half of the gear unit weight are held by clevis castings supported by the transom. Positively centered thermoid disk couplings are used. The link between the gear unit and the clevis casting has a ball and socket joint at each end, permitting freedom of motion in any direction to take care of the movement of the car axle. The brake rigging is the West Penn standard, helping to give a very neat appearance to the truck. Tranverse leaf springs and coil journal-box springs contribute to the riding qualities of the car. Brake hangers are so constructed that noise is prevented even when the parts become worn. Rigid attention was given to all factors which would promote riding comfort.

There are several ways in which the motor and drive helped to meet the requirements of the railway company in this application. Chief among these is the matter of weight reduction. By utilizing a high-speed motor wound for 300 volts, high temperature insulation and a double reduction drive, sufficient clearance was obtained to permit the application of 22-in. wheels. The resulting economies in weight were sufficient to bring the total car weight to 32,100 lb., without the necessity of utilizing aluminum construction except in the seats and around the control panels. The body weighs 18,700 lb., while one truck complete with motors weighs 6,600 lb. with rolled-steel wheels, or 6,800 with cast-steel wheels. This truck weight is the lightest of any WN drive truck in operation. The 6,600 lb. for the truck with rolled-steel wheels corresponds to 7,850 lb. for a truck recently built and equipped with axle-hung 35-hp. motors and 26-in. rolled-steel wheels. This corresponds to a reduction of 2,500 lb. per car and, if axle-hung motors had been considered for the Allegheny Valley cars, such an increase in car weight would have been almost certain to prohibit the application of 35-hp. motors for the schedule desired.

Through the utilization of 22-in. wheels, it has been possible to construct the cars with only one step and without a ramp in the floor. This reduces accident hazards and claims and cuts down the stop time, permitting higher schedule speeds. The latter is of especial interest to the transportation department of the company because the schedule under which the cars will operate is a difficult one. The gear ratio had to be chosen so that a high balancing speed would be available where there was an opportunity to use it, while a high accelerating rate was desired in the frequent-stop service.



Wide windows, narrow sashes and a single step contribute to attractive appearance of new West Penn cars

New Brooklyn Cars Now in Service

The first of an order of 100 trolley cars, ordered during the latter part of last year by the Brooklyn & Queens Transit Corporation, have arrived and are now in service in that city. It is expected that the entire 100 cars will be in service within the next two months. The order was divided between the Osgood-Bradley Car Company, of Worcester, Mass., and the J. G. Brill Company, each concern supplying 50 cars.

Cars are equipped with four 35-hp. motors, and the control equipment is of the automatic acceleration type similar to that used on subway cars. This feature makes the new cars especially effective in congested traffic areas as it is expected to enable them to keep abreast of, if not outdistance, automobile traffic using the same streets. This type of control permits the car to pick up speed rapidly and automatically and without any noticeable jolting as it changes from one speed to another. Acceleration is provided at the rate of 3 m.p.h.p.s. and deceleration, or braking, at the rate of 2½ m.p.h.p.s. This is an unusually high rate of acceleration for a surface car and is required to enable the cars to pick up speed, when starting, as rapidly as an automobile. Control and motor



Wide windows, ample and well distributed illumination and comfortable seats contribute to the attractiveness of the new Brooklyn cars



Forward platform of new Brooklyn car, showing motorman's control and arrangement of automatic turnstile at entrance to passenger well

equipment was provided by the Westinghouse Electric & Manufacturing Company.

The new cars are of the front entrance, center exit type, and are equipped with prepayment fare turnstiles. In order to give maximum seating capacity, single-end control is provided. The cars have seats for 54 passengers. Leather upholstered, spring cushion seats are supplied, the supports and backs of which are made of aluminum. Thirty-two of the seats are arranged in pairs—ten pairs on one side of the car and six pairs on the other—and the remaining 22 seats are single seats running lengthwise along the sides and around the rear end. This arrangement is designed to provide a maximum of aisle space.

Detailed specifications include:

Air brakes	Westinghouse
Armature bearings	Plain
Axles	3½x7-in. Carnegie
Car signal system	Faraday
Compressors	Westinghouse D-H-16
Conduit	Metal
Destination signs	Hunter illuminated roll
Door mechanism,	Consolidated Car Heating Company
Doors	Folding
Energy saving device	Arthur
Fare box	Perey, on passimeter
Finish	Enamel
Floor covering	Tuco
Gears and pinions	Nuttall
Hand brakes	National Brake Company
Heaters	Railway Utilities Company
Headlights	Ohio Brass Company
Headlining	Aluminum
Journal bearings	Plain
Journal boxes	J. G. Brill
Lamp fixtures	Electric Service Supply Company
Motors	4 Westinghouse, No. 510-A, inside hung
Roof material	Wood, canvas covered
Safety car devices	Westinghouse
Sash fixtures	O. M. Edwards Company
Seating material	80 cars, leather; 20 cars, wood
Slack adjusters	Westinghouse
Steps	Stationary
Step treads	Feralun
Trolley catchers	Ohio Brass Company
Trolley base	Ohio Brass Company
Trolley wheels	Ohio Brass Company
Trucks	J. G. Brill, 177-E-1
Ventilators	Railway Utilities Company
Wheels	Rolled steel, 26 in. diameter
Lifeguard	H-B

By the use of aluminum for interior panels and headlining, with the car body itself constructed of steel, the weight is kept to 37,000 lb. The roof is of the arch type with twelve ventilators. Porcelain handrails suspended from the ceilings at a height of 6 ft. from the floor take the place of hand straps. The floors are of the same composition as the floors of subway cars, a ½-in. layer of this composition being laid over steel sheets ½ in. thick. Each car cost approximately $16,000.

Contracts Awarded for New Baltimore Cars

Of the 150 new street cars which have been ordered by the United Railways & Electric Company, of Baltimore, announcement of which appeared in ELECTRIC RAILWAY JOURNAL NEWS of March 22, 1930, 100 will be built by the J. G. Brill Company and 50 car bodies will be supplied by the Cincinnati Car Company. The Brill Company is to supply trucks for the entire order. The total estimated cost of the new rolling stock is set at $2,550,000.

The new cars are to be of all-steel construction and will embody all of the latest developments making for passenger comfort, quick loading and alighting, and quiet operation. Front entrance and center exit arrangements will be incorporated in the design, the passengers depositing their fares as they pass the conductor, who is to be stationed near the center of the car. Quick acceleration and deceleration will be provided so as to enable the new cars to take their place in high-speed traffic.

Prior to the awarding of the contracts, representatives of a number of car builders as well as appliance manufacturers were invited to Baltimore and acquainted with the company's ideas, following which a number of tests were made at the Carroll Park shops of the United Railways & Electric Company. Complete specifications are not at present available but will be announced at an early date.

North Shore Line Receives 25 New Motor Cars

Twenty-five new all-steel passenger motor cars, costing approximately $850,000, have been delivered to the Chicago, North Shore & Milwaukee Railroad by the Standard Steel Car Company, of Hammond, Ind. This makes a total of 40 new all-steel motor cars purchased by the North Shore Line during the past two years.

The new cars are provided with easy-chair type seats upholstered in Byzantine plush, a double heating system (hot water



General view of five-car train made up of new all-steel coaches, 25 of which have been placed in limited service on the North Shore Line

and electric) thermostatically controlled, two toilets and a smoking compartment in each car, an auxiliary lighting system for emergencies, larger windows increasing visibility for passengers, and individual ventilators in each window, as well as electric fans and ceiling ventilators in each car. Each car has four motors with a total of



Individual easy chairs are a feature of the new coaches recently acquired by the North Shore Line for service between Chicago and Milwaukee

560 hp., and weighs 51 tons. Improved air-brake equipment and motor control are important mechanical features. The cars are painted in the new North Shore Line colors, orange with maroon trimmings, adopted as a measure of public safety by increasing the visibility of trains.

Trolley Buses Arrive in Knoxville

Four trolley buses, intended for service on the Cumberland and Kingston Pike lines of the Knoxville Power & Light Company, have arrived in that city and will be placed in regular service about May 1. The coaches, which seat 42 passengers each, were supplied by the Cincinnati Car Corporation at an approximate cost of $50,000.

ANNOUNCEMENT is made that the City of Detroit, Department of Street Railways, will open bids on April 11, 1930, for the furnishing of 130 cars of the Peter Witt type.

Considerable additional line work has been entailed in erecting a second overhead trolley wire parallel to the existing wire but the work is now well on the way to completion.

Chicago Surface Lines Orders Trolley Buses

As the result of the substantiation of the rights of the Chicago Surface Lines to supply bus service to certain sections of that city, orders have been placed for a total of 41 trolley buses to provide service over about 17 miles of route. The necessary expenditure has been authorized by the court and the new rolling stock is expected to be in service before many weeks. Twenty-nine of the vehicles will be built by the Twin Coach Company, of Kent, Ohio; six are to be supplied by the J. G. Brill Company, and six by the St. Louis Car Company. The buses are to be powered with two 50-hp. motors and will be supplied with four-wheel air brakes.

Twin Coach Company has also recently supplied two urban type coaches to the Milwaukee Electric Railway & Light Company and five 40-passenger urban type coaches to the Boston Elevated Railway. The Boston Elevated Railway has also added two 40-passenger metropolitan type coaches, which were supplied by the American Car & Foundries Motor Company. North Coast Transportation Company, of Seattle, Wash., has also received two ACF 264-in. wheelbase chassis.

The White Company, of Cleveland, reports the sale of eight of its Model 65 buses to the Denver Tramway Company; four Model 50B buses to the Middlesex & Boston Street Railway, of Newtonville, Mass., and one Model 54A bus to the Super Power Company, of Springfield, Ill.

J. G. Brill Orders for Equipment Exceed 1929

Receipt of an order from the United Railways & Electric Company, of Baltimore, for car bodies and equipment aggregating in value more than $2,000,000, puts the business of the J. G. Brill Company for the first quarter of 1930 about 100 per cent of orders received during the same period of 1929. Sales in the first three months of the current year have been running at the same rate as in 1929, but with the addition of the order from Baltimore sales will amount to approximately $4,000,000, or just about double the amount of the first quarter of that year. Unfilled orders on the books on Jan. 1, 1930, are said to have been approximately the same as those for the previous year.

Bendix and Westinghouse Form New Company

Announcement is made jointly by the Westinghouse Air Brake Company and the Bendix Aviatioh Corporation of the formation of a new company to be known as Bendix-Westinghouse Automotive Air Brake Company, the entire capital stock of which is to be held by the Bendix Aviation Corporation and the Westinghouse Air Brake Company.

The new company will continue the operation of what has heretofore been the automotive division of the Westinghouse Air Brake Company and will continue to supply the well-known Westinghouse air brake equipment for buses, trucks and other types of automotive vehicles. Westinghouse will continue the manufacture of the automotive air brake equipment for the new company.

General Electric Had Record Year in 1929

In volume of orders received, shipments billed, and in total profits and earnings per share of common stock, the year 1929 was the best in the history of the General Electric Company, according to the annual report for that year, just released by Gerard Swope, president. Orders received increased 28 per cent over 1928. Sales billed increased 23 per cent, net income from sales showed an increase of 24.5 per cent and earnings per share of common stock increased 25 per cent. Profits available for dividends amounted to $67,289,880, equivalent, after dividends on special stock, to $8.97 per share on the no par common.

Substantial expenditures were made during 1929 for the consolidation of manufacture of related products at one place. This policy has been found to improve service and efficiency and to reduce costs. No new buildings of importance were added, but a number of existing buildings were rearranged, and a total of $20,000,000 was expended upon plant improvements.

Star Brass Works, Kalamazoo, Mich., is distributing an attractive catalog illustrative of its products, which include trolley wheels and harps for street railways, mining operations, electric cranes and other uses.

ELECTRIC RAILWAY MATERIAL PRICES—APRIL 1, 1930

Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.00
Lead, cents per lb.	5.50
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	5.25
Tin, Straits, cents per lb.	37.62
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	41.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.35
Somerset mine run, f.o.b. mines, net ton	2.00
Pittsburgh mine run, Pittsburgh, net ton	1.40
Franklin, Ill., screenings, f.o.b. mines	1.50
Central, Ill., screenings, f.o.b. mines	1.15
Kansas screenings, Kansas City	1.75

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive $\frac{5}{8}$ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angles bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.85
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.30
Sheet iron (24 gage), cents per lb.	2.70
Sheet iron, galvanized (24 gage), cents per lb.	3.35
Galvanized barbed wire, cents per lb.	2.95
Galvanized wire, ordinary, cents per lb.	2.90

Waste—New York

Waste, wool, cents per lb.	14.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	11.00
Colored	10.00

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	14.6
White lead in oil (100 lb. keg), cents per lb.	14.25
Turpentine (bbl. lots), per gal.	0.61
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	$6.15
Weatherproof wire base, cents per lb.	18.50

Paving Materials

Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand	$150.00
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.95
Gravel, ¾-in., cu.yd., delivered New York	3.40
Sand, cu.yd., delivered New York	2.15

Old Metals—New York and Chicago

Heavy copper, cents per lb.	15.12
Light copper, cents per lb.	13.60
Heavy yellow brass, cents per lb.	8.12
Zinc, old scrap, cents per lb.	2.00
Lead, cents per lb. (heavy)	4.00
Steel car axles, Chicago, net ton	$16.25
Cast iron car wheels, Chicago, gross ton	14.75
Rails (short), Chicago, gross ton	18.25
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.75

Safety...

Put yourself in the position of a motorman who has to compromise the factor of security because of questionable brakes.

Could you meet schedules 100% and maintain an accident free record?

National Brake Company, Inc.
890 Ellicott Square Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Co., Ltd., Montreal, Can.
The Ellcon Co., General Sales Representatives
50 Church St., New York



PEACOCK
Staffless Brakes



Illustration showing the new Texaco Oil seals and the ease of application. Texaco Oil Seals are simply inserted in the regular dust guard slot in back of the journal box and form an effective permanent barrier against oil leakage or access of dust and water.

LAST YEAR'S LUBRICANTS ARE DECIDEDLY OUT OF DATE

TEXACO provides an entirely new system of electric railway lubrication and a new car-journal lubricant. Texaco Lovis Oil and the system, in which the use of Texaco Oil Seals is an important factor, promise to save hundreds of thousands annually for the industry.

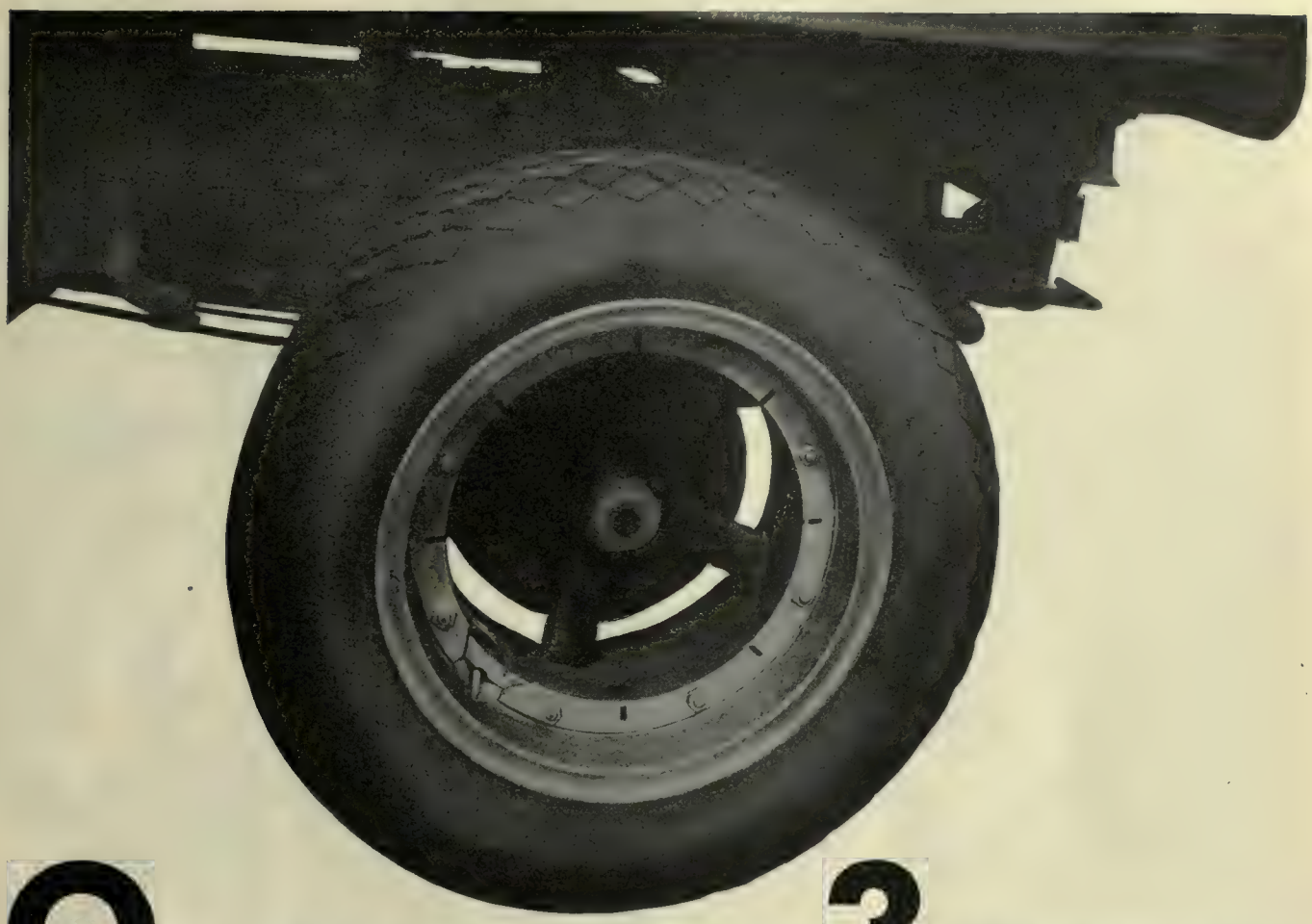
Here are the advantages:—1. A substantial saving in power; **2.** Increased car operating speeds; **3.** Reduced waste consumption; **4.** Lower labor costs; **5.** Lower maintenance; **6.** A saving in oil house costs; **7.** Lower costs for lubrication.

The new Texaco System is now being put into effect on many of the leading lines of the country. Texaco Lubrication Engineers will, on request, arrange for conclusive tests on any road.

Write The Texas Company.

THE TEXAS COMPANY 17 BATTERY PLACE, NEW YORK CITY

TEXACO LUBRICANTS



OFF IN LESS THAN 3 MINUTES

TYPE "K" RIMS SAVE TIME ON TIRE CHANGES



The ease with which Goodyear Type "K" Rims are slipped on and off despite rust, dirt, or ice is a big reason for their success. They come off your tires in an instant—THREE MINUTES OR LESS is enough.

Type "K" Rims are light, trim, and cool running. Built in two sections, one split and one endless, they are powerful and yet easy to handle. Your drivers and repair men will like this light and mechanically able equipment.

"THE MAN WHO CHANGES THE TIRES LIKES GOODYEAR TYPE 'K' RIMS"

Change-overs from solid or cushion tires to pneumatics are simple matters with Type "K" Rims. You just cut down your old wheels and weld on single or dual Type "K" felloes. Then, more power, smarter appearance, and less trouble all around.

Write today to Goodyear, Akron, Ohio, or Los Angeles, California for detailed information on sensible Type "K" Rim equipment for trucks or buses.

GOODYEAR

TYPE "K" TRUCK AND BUS RIM EQUIPMENT

Ohio Public Service Service



CITIES SERVICE OILS

ONCE - ALWAYS

BUS owners throughout the country are adopting Cities Service and Koolmotor gasolene, oils and greases because they know that every Cities Service product has undergone the gruelling test of actual service in the fleet of more than 4,000 motor vehicles operated by Cities Service subsidiaries.

For example—buses in Mansfield, Ohio, operated by The Ohio Public Service Company, a Cities Service subsidiary, travelled 235,000 miles in 1929 and carried 692,000 passengers. Koolmotor gasolene, Cities Service bus oil and Cities Service greases help in the efficient operation of these buses, in maintaining schedules and in minimizing expense.

Cities Service engineers who have worked out the problems of Cities Service transportation fleets will gladly study your bus problems and recommend the scientifically correct lubricants and fuels that will help reduce your maintenance costs and safeguard your expensive equipment.

CITIES SERVICE COMPANY

60 Wall Street New York City

KOOLMOTOR PRODUCTS

Buses Prove Cities Quality





Company:
The Ohio Public Service Company

Location of Property:
Mansfield, Ohio

Yearly Bus Mileage:
235,000 miles

No. of Passengers Carried:
692,000

Cities Service Products Used—

Koolmotor Gasolene
Cities Service XX Bus Oil
Cities Service Greases



A Production Tool Worthy of the Task

SPRAY painting equipment used in industry today must measure fully up to the speed and efficiency of the most advanced production units in other departments.

DeVilbiss spray systems for use in railway finish maintenance operations—cars, buses, and buildings—are engineered with a complete understanding of the demands that will be made upon them.

This involves a constant study of the changing methods and improved devices which progress brings into every highly competitive operation. Users of DeVilbiss spray systems never find their finishing operations lagging behind improvements made in other directions. DeVilbiss equipment is designed with a complete understanding of all the processes employed in the plant where the DeVilbiss system is used. The constant improvement in every detail of a DeVilbiss spray outfit is reflected in a constantly lowering cost of finishing by reason of new economies in time consumed, labor and materials. You can always learn from DeVilbiss whether your finishing operation is as modern, efficient and economical as it should be. Such information costs you nothing. It may save you much.

DeVilbiss Provides Everything Needed

Spray guns of various types and sizes.

Pressure feed paint tanks and containers.

Spray booths, exhaust fans, and approved lighting fixtures.

Air compressing equipment.

Air transformers and accessories.

Air and fluid hose and connections.

Complete outfits from the smallest hand-operated units to the largest industrial installations.

DeVilbiss

Spray-PAINTING FINISHING System

THE DeVILBISS COMPANY

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Sales and Service Branches

New York Philadelphia Cleveland Detroit Indianapolis Chicago St. Louis San Francisco Los Angeles Windsor, Ont.

Direct factory representatives in all other territories



A Comfortable, Sanitary and Modern Seat!

HERE is a seat which maintenance engineers will appreciate. Its close-woven cane webbing back and cushion are easy to keep clean. The genuine leather facing on the cushion reinforces the seat at the greatest point of wear. In addition, the individual backs and deep, spring cushions are shaped to allow proper posture and leg freedom. Mechanism rails are set in and the frame of the chair is made of selected Northern hard-grained ash, further strengthened by malleable iron braces. Write to the nearest Heywood-Wakefield sales office for complete details of the 327-M Special and other popular bus and electric railway seats in our line.



If you have not received a copy of our new Bus Seat Catalogue, write for it.

HEYWOOD - WAKEFIELD COMPANY

BOSTON, MASSACHUSETTS

516 West 34th St., New York City
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
439 Railway Exchange Bldg., Chicago, Ill.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
The G. F. Cotter Supply Co., Houston, Texas
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada



ALMOST SEVEN MILLION MILES LAST YEAR

The coaches of Consolidated Coach Corporation travel the roads of Kentucky and Tennessee. They penetrate into Indiana and Ohio—they cross the state lines of the two Virginias. The coaches of the Kentucky Coach Company travel entirely on city streets. The combined mileage of these two operations totaled 6,919,491 miles in 1929—all on Goodyears.

For more than three years now, no other tires have been used except Goodyears, because these companies, like so many others, have found the long mileage, the stamina, the freedom from delays, the safe, surefooted traction of Goodyear Tires best suited to their demands of safety, maintained schedules and economy.

More people ride on Goodyear Tires than on any other kind—for the very good reason that experience has demonstrated Goodyear superiority.

Isn't this a good reason for asking a Goodyear Truck and Bus Tire Service Station Dealer about the extra benefits these famous tires could bring to your fleet?

THE GREATEST NAME IN RUBBER

GOODYEAR

ON YOUR NEXT COACHES SPECIFY GOODYEARS


1
YEAR AND A HALF AGO WE BOUGHT
OUR FIRST a.c.f.—TODAY WE HAVE
3
a.c.f. COACHES IN OPERATION





61 motor coaches on 78 miles of routes, running 3,200,000 miles in 1929, carrying 45,000 passengers each day

Record of Bee Line purchases of A.C.F. coaches

8* in July, 1928
2* in September, 1928
2† in September, 1928
10* in February, 1929
2* in May, 1929
4** in July, 1929
4** in March 1930

*A.C.F. Model 508-9D11, 33-passenger urban coach.
†A.C.F. Model 601-2D9, 23-passenger urban coach.
**A.C.F. Model 511-3H7, 40-passenger Motor coach.



The Bee Line is one of Long Island's most important motor transport lines. The experience of the men who have built this business from scratch, is worth any operator's attention. Listen to Mr. H. B. Carter, President of the Bee Line:

"A year ago last August, we bought our first G.C.F. coaches—five 33-passenger jobs. Since then, we've reordered several times, and at present, we have 32 G.C.F. busses in operation. Twenty-two of them are 33-passenger models. Two are 23-passenger jobs which we use on cross routes. And eight are Metropolitan street-car-type models, which we keep busy all day long on our heaviest runs.

"Mileage? Well, the first five jobs have been on the road now for eighteen months and every one of them shows 120,000 miles or better. We keep detailed cost records on every coach we run, and these G.C.F. coaches show an average operating cost, including overhead and everything, of about 29¢ a mile.

"We didn't choose G.C.F. blindly. We've used several makes of coaches, and they have all been good. But the things G.C.F. offered were quite a little better . . . more passenger comfort, and that is a very important point in any operation . . . more inside room . . . more air space . . . better appearance.



"And then A.C.F. are six cylinder jobs. That means smoother operation, and we have found that they don't cost any more to run than fours. We've had less trouble with them. They've stayed on the road better than any coaches we've ever had. Our routes run normally through level country, but for the last year or more, long stretches both on the Merrick Road and the Hempstead Turnpike have been under construction, and we've had to run constantly over extremely rough detours.

"They say that the proof of the pudding is in the eating. Well, if that is the case, all I can say is that for the last nineteen months, we haven't added any coaches except A.C.F. And they have certainly given us record service!"



The A.C.F. Metropolitan Coach and the advantages it offers you

An operating life of ten to fifteen years at a minimum. A seating capacity a third greater, and a standee capacity of 100 to 150% greater, than the usual 230" wheel base coach. Body maintenance practically eliminated. The all steel body-chassis is built as a single unit of 16-gauge steel panel-plates *riveted* to steel posts, which are integral parts of the chassis structure. A six cylinder Hall-Scott engine designed expressly for bus service and improved by seven years of constant refinement. The Metropolitan is built by the American Car and Foundry Motors Company—your guarantee of quality and satisfaction.

BRIEF SPECIFICATIONS

Wheelbase	230".	Tires	38"x9". (single front, dual rear).
Capacity	40 seated passengers.	Transmission	3 speed.
Construction	All steel; body-chassis built as a single unit.	Rear Axle	Worm drive, full floating.
Engine	Hall-Scott, 6 cylinder 120 H.P.	Weight distribution, loaded	⅓ on front axle; ⅔ on rear axle.
Drive Shaft	Only 24".		

Mechanical or gas-electric drive available.

a.c.f.

AMERICAN CAR AND FOUNDRY MOTORS COMPANY, 30 Church St., New York City

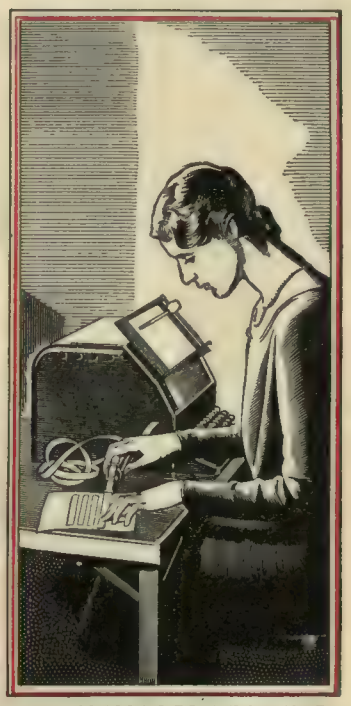
Typewritten Simultaneously in Every one of your Offices



BRANCH OFFICE EXECUTIVE RECEIVES THE MESSAGE AS IT IS TYPED IN HEADQUARTERS



SENDING THE MESSAGE FROM HEADQUARTERS TO THE FIELD



ALL MESSAGES RECEIVED MAY BE PASTED ON LETTER-HEAD SIZE PAPER FOR FILING

Telephone Typewriter Service speeds modern business by providing instantaneous typewritten communication between the different units of an organization. It weaves together headquarters, factories, branch offices and warehouses almost as closely as though they were under one roof.

A large metal company uses the service to connect its New York office with its mill in West Virginia. Orders, general information, administrative matters, specifications, cost estimates, stock on hand, shipments, etc., are reproduced instantly and accurately at either end. A tobacco company transacts much of the business between its plants in southern states by telephone typewriter. Several hundred messages are exchanged each day.

Telephone Typewriter Service is proving its worth for banks, manufacturing concerns of all kinds, public utilities, government departments, insurance companies, export firms, department stores, travel bureaus. It makes executive control easier and more complete. Facilitates immediate action on vital matters. Transmits important business information while the information is still of value. It is quick, accurate and private.

Would constant, unlimited, two-way written communications be of value to your business? Telephone Typewriter Service can be fitted to your exact requirements. Your local Bell Telephone Business Office will gladly give you complete information.



When age makes modernize



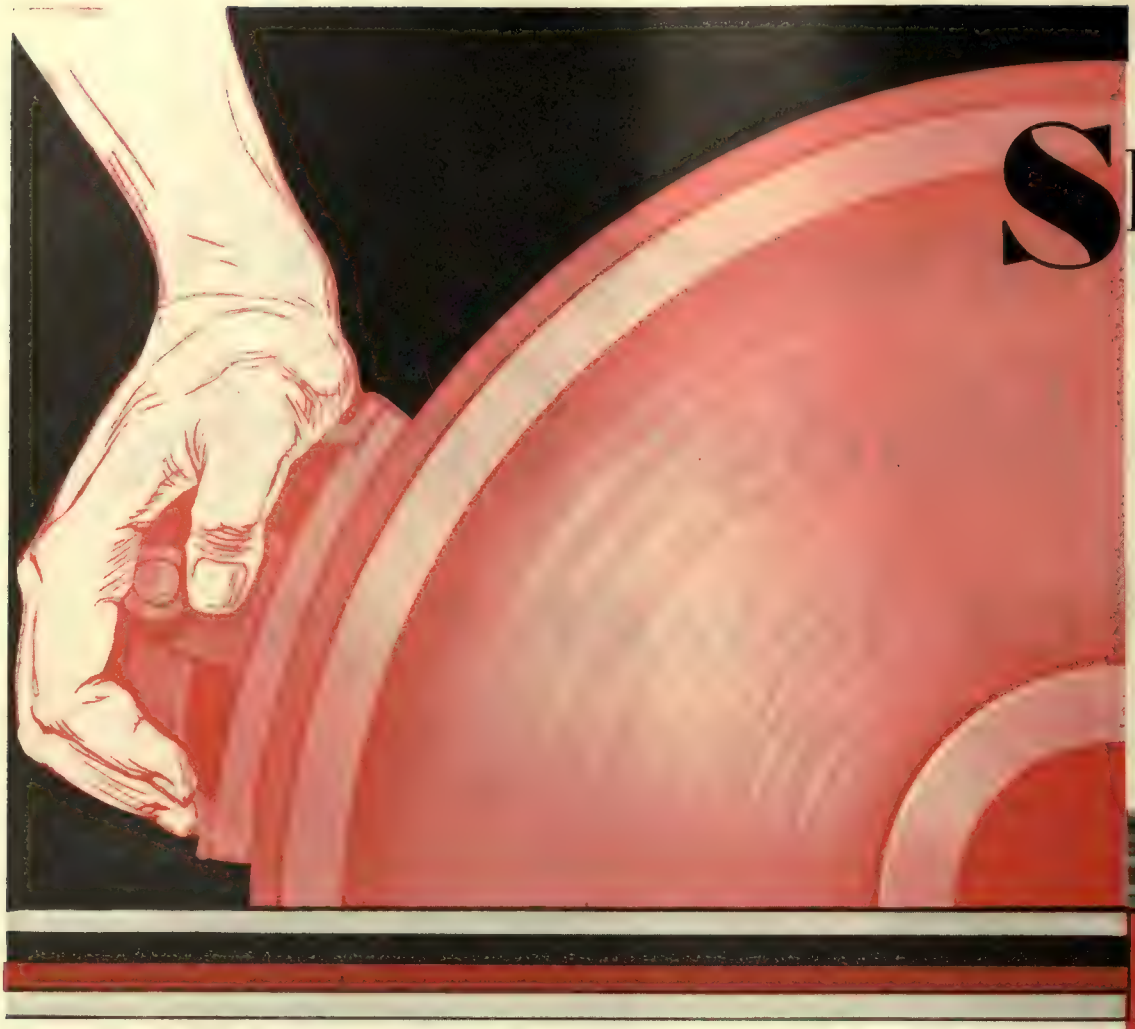
DODGE BROTHERS

maintenance costly, with Dodge Coaches for lower costs



Maintenance is essential to efficient motor coach operation—as every experienced operator knows. But excessive maintenance costs need not be tolerated. Worn-out coaches that require costly repairs are actually a liability. » » » Operators, large and small, have proved conclusively the wisdom of periodic replacement—modernization with Dodge Brothers Motor Coaches. With these practical coaches—the 21-passenger Street Car or the 16-Passenger Parlor Coach—owners are enabled to lower their maintenance costs, lower their operating costs and please their patrons.

MOTOR COACHES



Speed

Balanced
Braking

Simplex Multiple Unit Clasp Brakes

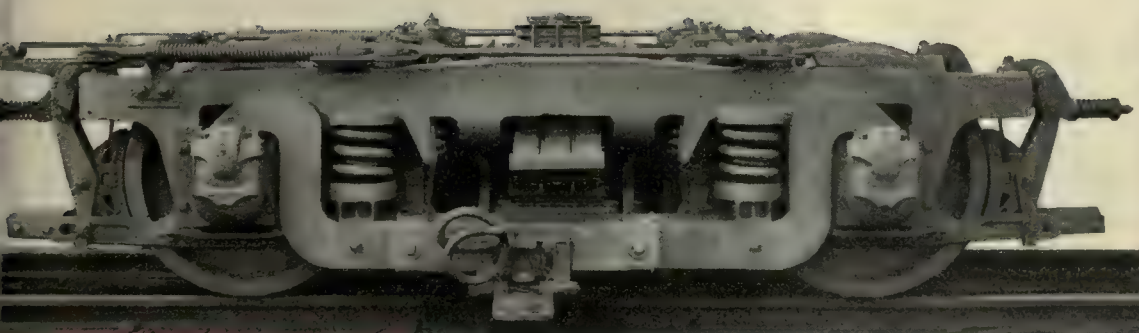


ASF

AMERICAN

NEW YORK

with Safety for P. R. T.





BRAKING today is an important consideration. Upon braking depends faster service and better schedules even though there are frequent stops.

Philadelphia Rapid Transit chose Simplex Multiple Unit Motor, Trailer and Truck Clasp Brakes for their 154 subway cars. P. R. T. service necessitates exacting brake requirements. The answer was complete Simplex installation—SPEED WITH SAFETY.

Simplex Multiple Unit Clasp Brakes give quick and smooth retardation and full release permitting rapid acceleration. Passenger comfort is assured. Wear and tear on truck equipment is minimized. Brake and truck maintenance is reduced.

The American Steel Foundries has an engineering staff which will develop the entire brake rigging design for efficient brake application. Due to different truck and underframe construction each clasp brake design is subject to an individual engineering study. Let us cooperate with you.

STEEL FOUNDRIES

CHICAGO ST. LOUIS

ASF

A Comfortable, uninterrupted ride

is the best method a traction company can employ in overcoming automobile competition. Attractive car service removes the incentive for the motorist to provide his own transportation—especially in view of the ever-increasing difficulties of parking.

Riding comfort begins with the track. Carnegie Steel Cross Ties provide the foundation for a smooth, repair-free track—a track that saves wear and tear on rolling equipment and greatly enhances its comfort—a track providing long, continuous service. Carnegie Ties are easily installed. The bolt and clip by which the rail is secured are simple and efficient. The unit cost (cost per foot of track per year) is considerably less than for wood ties. Carnegie Steel Cross Ties will prove a profitable investment—particularly from the standpoint of passenger satisfaction . . . New booklet on request.

Carnegie Steel Company - Pittsburgh, Pa.

Subsidiary of United States Steel Corporation

61

CARNEGIE
STEEL CROSS TIES



Mica in every form

for A.C. motor insulation

Protect A. C. motors and generator slot cells and coil phase sections with built-up mica! That's the way to assure lasting maintenance-free performance and the maximum of operating efficiency. Super-Micanite is practically indestructible under the heat and vibration of the severest motor and generator operation.

Flexible Super-Micanite in sheets or strips, Micanite Coil Insulation, Rope Paper and Mica, Micanite Paper, and Micanite Tape represent the built-up mica insulations ideal for A. C. machines. And the Mica Insulator Company offers in addition a complete line of Varnishes, Armco Paper, Varnished Cambric Tubing, in fact, a performance-proved electrical insulation for every need from slots to leads.



Complete information is given in Catalog 87. Write for a copy.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.

Works: Schenectady, N. Y. London, England

Cleveland Pittsburgh Cincinnati Birmingham Seattle
San Francisco Los Angeles Toronto Montreal

PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION

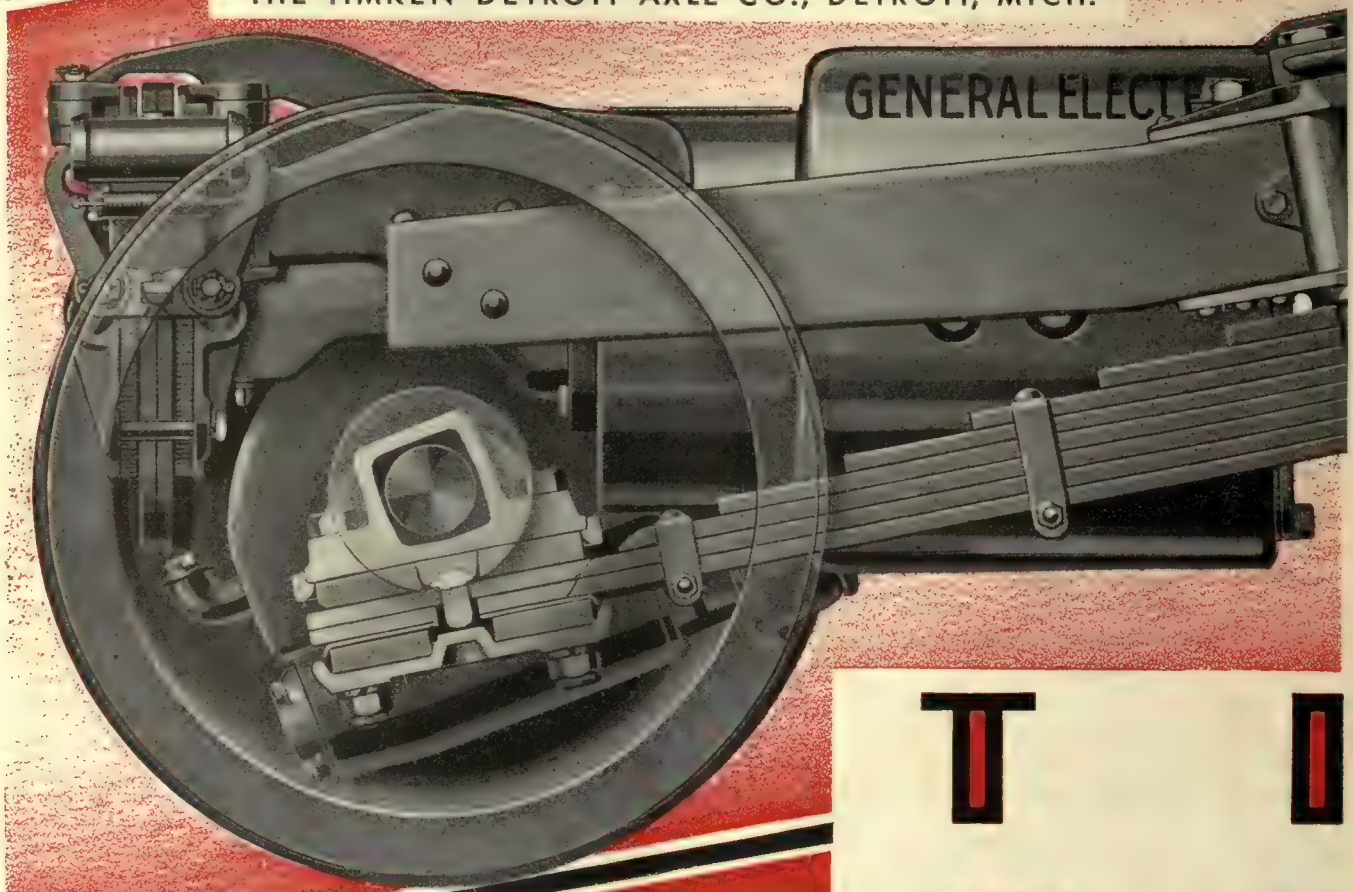
It's Velvet!

EITHER way you look at it—getting and holding more patrons for your cars, or cutting your operating costs—the result is "velvet".

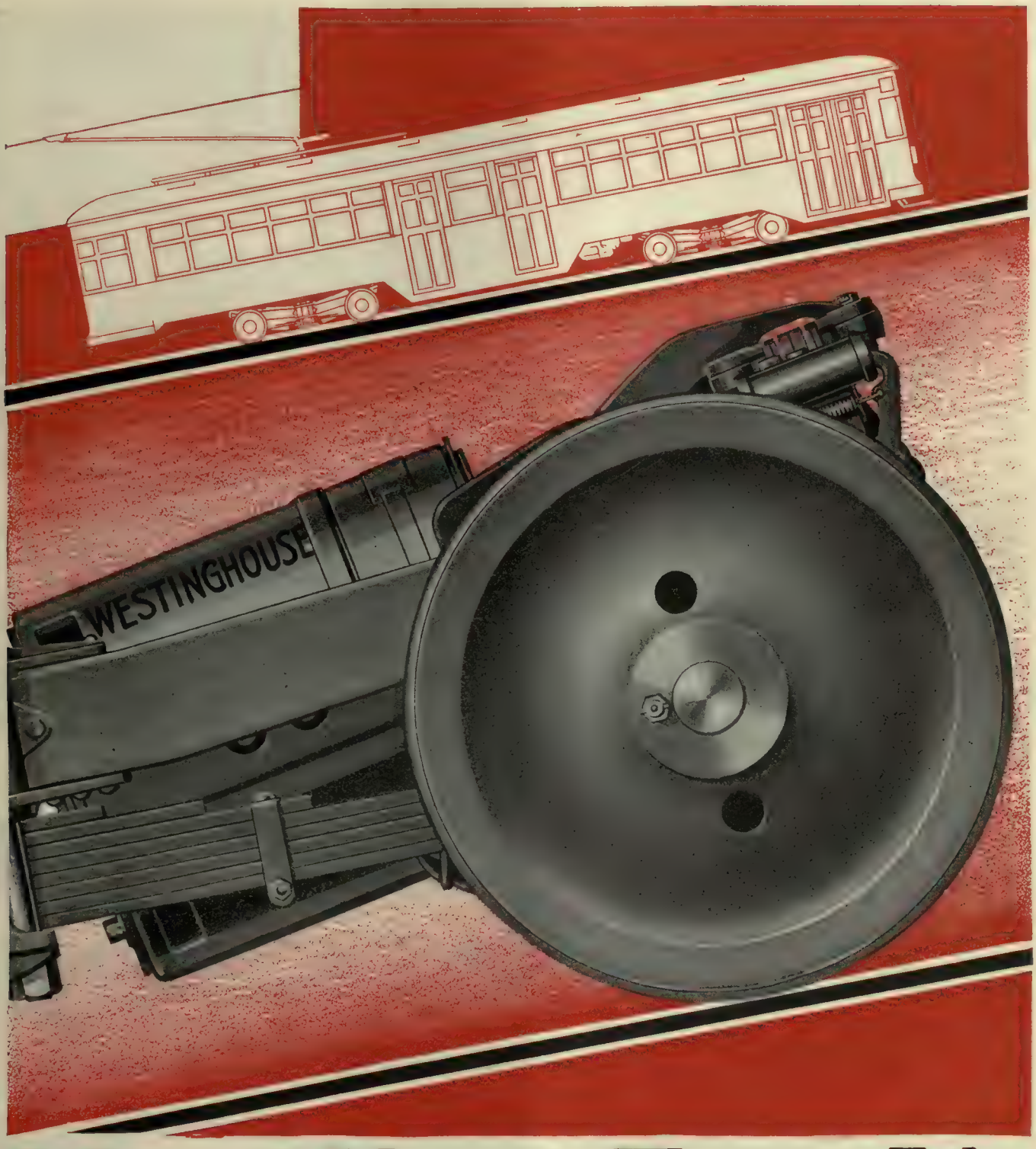
Timken Worm Drive for street cars helps *both ways.*

Less noise, less weight, smooth speed—these attract and hold more riders. Power savings, lower costs of maintaining rails and equipment—these cut operating expense.

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.



T T
D A CO
T T



M K E N

worm drive

R U C K S

FOR ELECTRIC RAILWAY CARS



WACO SPUN

A PROFITABLE

Uniform Performance in Service
Lower Average Wheel Costs.

When

THE MULTI

The National Malleable and
Cleveland,



STEEL WHEELS

SUMMARY...

Better and More Effective Car Maintenance
All Factors Leading To Economical Operation
Using

MATE WHEEL

Steel Castings Company
Ohio. U. S. A.



GOOD WILL IS IMPORTANT— DON'T RUIN IT WITH FUMES



Good will is important to any business . . . it is a priceless asset to the transportation company. If your motor coaches are releasing objectionable fumes . . . if they are gassing pedestrians and potential patrons . . . they are seriously endangering good will and your business.

The sulphur and impurities that are present in many fuels and lubricants, are a major cause of obnoxious combustion odors. Red Crown Gasoline and Polarine Motor Oil, highly refined, pure and practically free from sulphur, do not produce these stifling combustion odors.

As a motor fuel Red Crown ranks at the top, giving power, mileage, economy. Polarine is pure and rich, supplying thorough, efficient lubrication to the motor. Working together they give that perfectly balanced performance which insures dependable service and low cost operation.

A test will convince you that Red Crown and Polarine form an ideal combination for your motor coaches.

STANDARD OIL COMPANY
(INDIANA)

910 S. MICHIGAN AVE. CHICAGO, ILL.

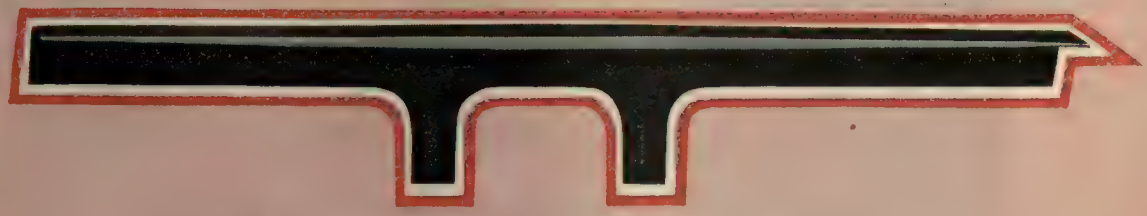
1327

Chicago, Davenport, Decatur, Des Moines, Detroit, Duluth, Evansville, Fargo, Grand Rapids, Green Bay, Huron, Indianapolis, Joliet, Kansas City, La Crosse, Mankato, Mason City, Milwaukee, Minneapolis, Minot, Saginaw, Sioux City, Peoria, Quincy, South Bend, St. Louis, St. Joseph, Wichita

RED CROWN GASOLINE

POLARINE MOTOR OIL

TRUE TEMPER TAPERED RAIL JOINT SHIM



The Remedy for Low Joints caused by wear



The above shows Joint Shim in position with angle bar removed.



The above shows Joint Shim in position between Bar and Ball of Rail.

Other True Temper Products for Electric Railway Use:

Safety Rail Forks
Railroad Scuffle Hoes
Ice Chisels
Road, Gravel and Cleaning Rakes
Sidewalk Cleaners

Send for a free copy of our Catalog RAD1, which describes these and other True Temper Products for Electric Railway use.

THE AMERICAN FORK & HOE COMPANY

General Offices: CLEVELAND, OHIO; Factory: NORTH GIRARD, PA.

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Whitehall Bldg., New York, N. Y. Daily News Plaza, Chicago, Ill.

Representatives at
Boston, Denver, Detroit, Minneapolis, St. Louis and San Francisco

Foreign Representatives
Wonham, Inc., 44 Whitehall St., New York, N. Y., and
68-72 Windsor House, Victoria St., London, S.W.-1.

Mack

IS ONCE MORE THE CHOICE OF THE CINCINNATI STREET RAILWAY COMPANY

Prominent Mid-Western Traction Company adds 10 Model BC (Intermediate Sixes) To Its Mack Fleet.



In 1926, the Cincinnati Street Railway Company made its first bus purchase. That the service has proven popular is evidenced by the fact that today, a fleet of 98 is being operated. Of this number, 53 are Macks.

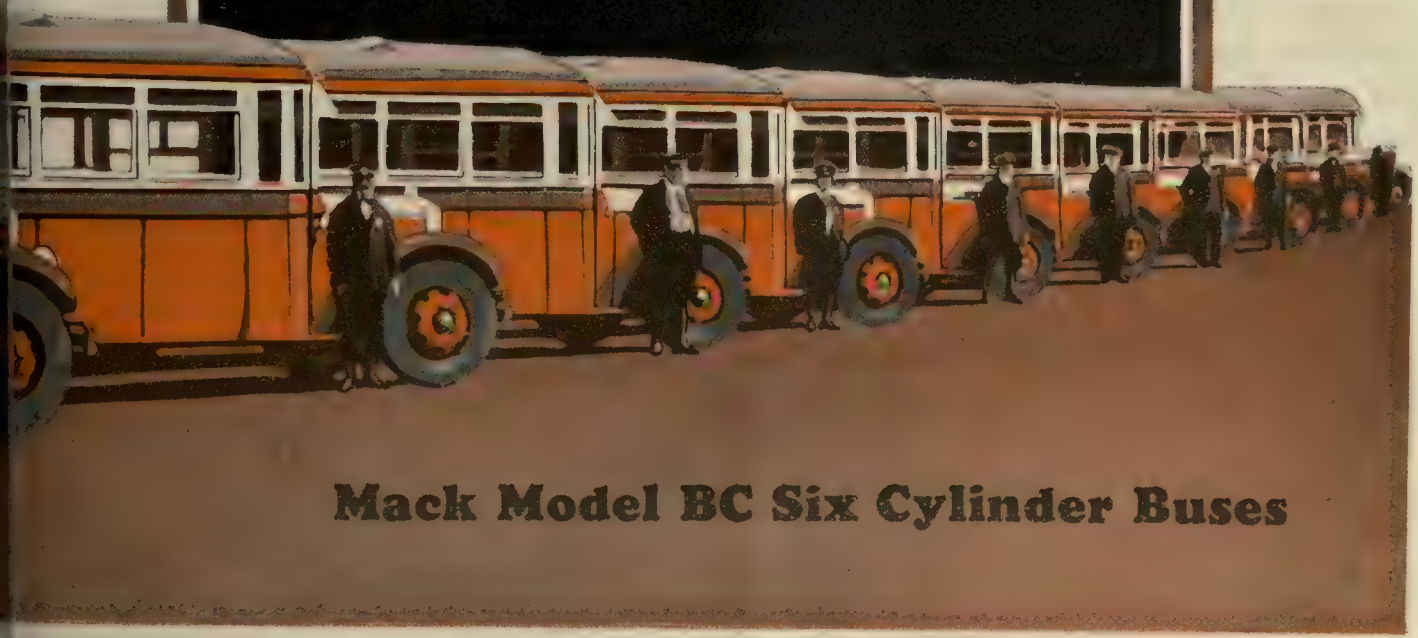
Recently, replacement of some of the older equipment became necessary. Basing its decision on Performance and Low Maintenance Costs; the company purchased 10 Mack Model BC city type buses equipped with Mack built bodies.

On the books, and on the road, the company has found that economy and dependability are synonymous with Mack. Added to these tangible features is the equally important feature of Good Will; indicated by the unsolicited praise from both drivers and passengers.

Invariably, where comparisons are available the choice is Mack

Mack buses are built with four or six cylinders in standard wheelbases ranging from 202½" to 265". Mack standard bus bodies are built for either city or interstate service with seating capacities ranging from 21 to 41 passengers.

Mack Trucks, Inc.
25 Broadway, New York, N. Y.



Mack Model BC Six Cylinder Buses

do you believe in evolution?



EVER SINCE 1874, when the Bastet Magnetic Engine appeared, designing engineers have been developing bigger and better motors. The basic principles embodied in the early designs have been applied more efficiently. New methods of construction have been adopted. The rugged, welded frame, synchronous motor, 10,000 times more powerful than its little forerunner, symbolizes this evolution. Many steps in this record of progress may be attributed to the development and constant improvement of National Pyramid Carbon Brushes.

The synchronous motor of today is the last word in efficiency. Maintenance has been reduced to a minimum. The load current reaches the stator windings without moving contact and only the direct current excitation of the revolving field is carried by the brushes and slip rings. But the selection of the proper brush grade is important. The ring surface must be kept well polished, free from spots or undue wear.

This, like the many other brush problems arising through the years, has been successfully solved by the unsurpassed research facilities of National Carbon Co., Inc. Electrical industry has presented thousands of uses for carbon brushes and a National Pyramid Brush has been available for each use.

★ ★ ★

The Eveready Hour, radio's oldest commercial feature, is broadcast every Tuesday evening at nine (New York time) from WEAF over a nation-wide N. B. C. network of 30 stations.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

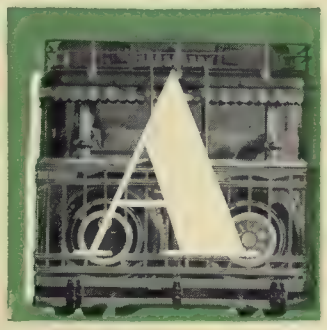
Carbon Sales Division — SILVER STRAND CABLE TRADE MARK REGISTERED — Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco

Introducing the New "W" Observation

215 inch Wheelbase



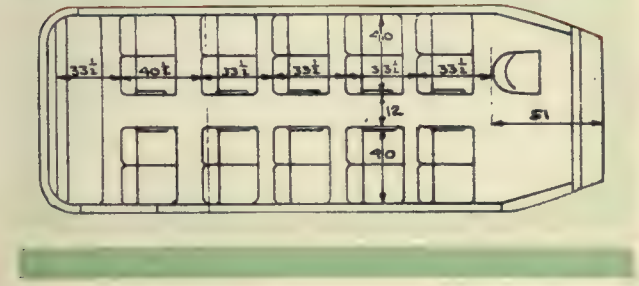
noteworthy addition to an already famous Yellow Coach family A new high headroom Parlor Observation Coach, wheelbase, 215 inches . . . body width, 96 inches . . . seats for 25 passengers with 33½ inch seat centers or optional for 21 passengers with individual reclining chairs on 38 inch seat centers. Maximum comfort. A roominess far beyond any previous coach design . . . yet the cost per passenger capacity due to standard design and construction, is unbelievably low.

It is powered with an engine whose capacity and flexibility has stood the test of time. Its quietness, freedom from vibration and quick, smooth acceleration make the maximum in rider appeal. Its brakes are quick and sure; ample for any emergency. Its ease of handling is comparable only to that of a passenger car.

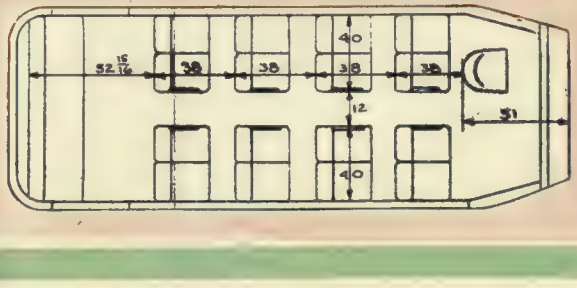




All of the excellent chassis features which made the Type W-185 coach so popular has been continued in this 215 inch chassis, with the addition of heavier construction for increased capacity. This new Parlor Observation coach takes rank as the first small capacity coach with all of the advanced engineering features and passenger comfort found in the finest of large parlor coaches. In fact the body construction is so similar to the new 33 passenger Yellow 250 inch wheelbase parlor coach that many body parts and sections are interchangeable.



Standard Seating Plan
Comfortable parlor chairs for 25 passengers on 33½ inch seat centers.



Optional Seating Plan
Luxuriously roomy. Widely spaced reclining chairs for 21 passengers on 38 inch seat centers.

Filling an important place in capacity for inter-city service between the 21 passenger and the 29 passenger coaches, it can be confidently predicted that the "W-215" will meet with the same popular approval accorded its predecessor, the "W-185", of which over 800 were sold in a little more than a year.

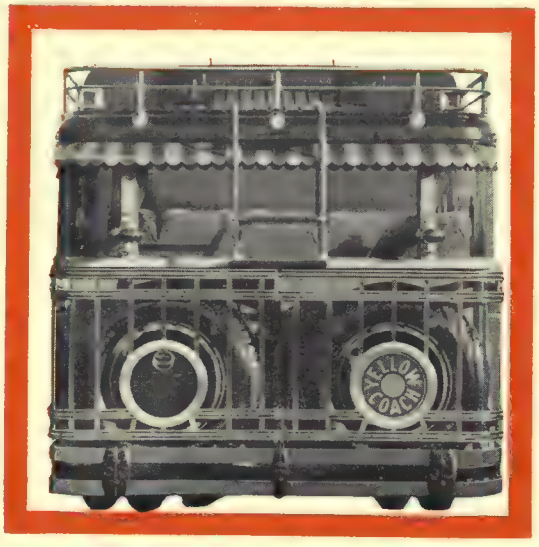
GENERAL MOTORS TRUCK CO. - - - - - - - - - - - Pontiac, Mich.

SUBSIDIARY OF YELLOW TRUCK AND COACH CO.

It pays to Standardize

With the addition of this new model operators requiring vehicles of different capacities and types may now standardize on any combinations of Type "W" and Type "U" coaches for city service, parlor de luxe service or inter-city work. Capacities range from 16 to 25 persengers with a choice of two different engines. Bodies and a majority of chassis parts and many body parts, are interchangeable. Maintenance is greatly simplified. Capital tied up in parts inventory can be greatly reduced. Standardization means greater operating flexibility, greatly simplified maintenance and better all around economy.

Type "U" 185" w. b. 16 pass. Parlor Coach.
Type "U" 185" w. b. 21-23 pass. City Service Coach.
Type "U" 185" w. b. 21 pass. Observation Parlor Coach.
Type "W" 185" w. b. 17 pass. Parlor Coach.
Type "W" 185" w. b. 21-23 pass. City Service Coach.
Type "W" 185" w. b. 21 pass. Observation Parlor Coach.
Type "W" 215" w. b. 21-25 pass. Observation Parlor Coach.



Features

Wheelbase—215 inches.
Engine—Cadillac V Type—8 cyl.
Generator—12 volt, 600 watt.
Transmission—Four speed.
Clutch—Twin disc.
Service Brakes—Duplex hydraulic four wheel with booster.
Emergency Brake—Propeller shaft. Pull on type.
Rear Axle—Underslung worm.
Tires—36 x 8.25.
Overall length of coach—27 feet, 7½ inches.
Overall width of body—96 inches.
Head room, at front in aisle—79 $\frac{13}{16}$ inches.
Head room, at rear in aisle—73 $\frac{3}{16}$ inches.
Standard seating—25 passenger on 33½ inch seat centers.
Optional seating—21 passengers, all reclining on 38 inch seat centers.
Interior luggage racks, also outside baggage rack.
Heating—Hot water, blower type.

TYPE W OBSERVATION 215 W. B.

YELLOW COACH

On This Famous Bus Network Extending

FROM THE

GREAT LAKES

TO

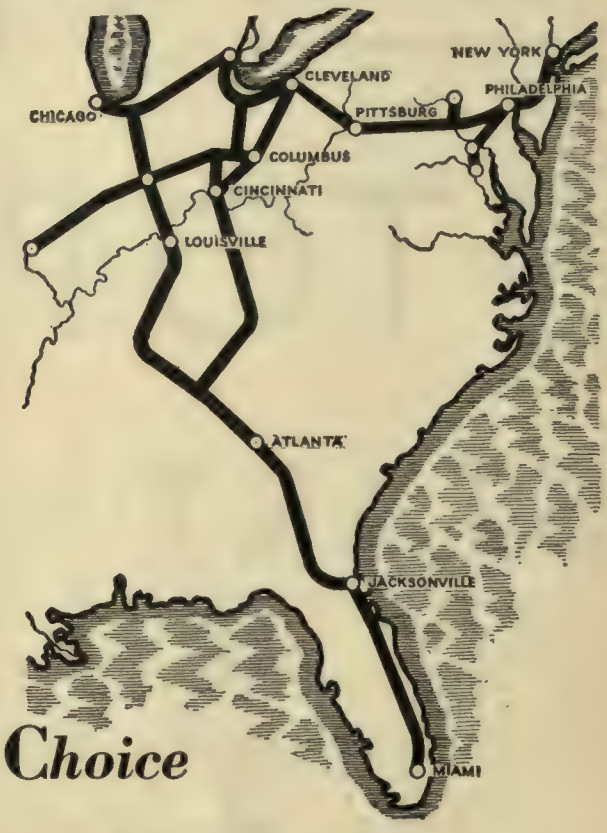
FLORIDA

THE

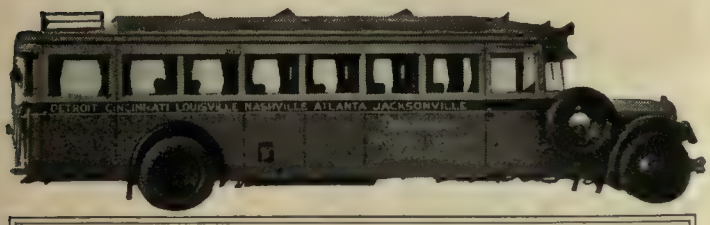
MISSISSIPPI

TO THE

ATLANTIC



Goodrich was the Natural Choice



7 Superior Specifications

Built into Every Heavy Duty Silvertown

1. Heavily insulated stretch-matched cords.
2. Additional adhesion — from greater insulation between outside plies.
3. Heavy twin beads for better rim seating.
4. Extra gum fillers between plies for longer tire life.
5. Heat-resisting, interlocking cord breakers.
6. Tread designed correctly for heavy duty service.
7. The whole tire toughened by the famous Goodrich "water cure."

C. S. WARNER, President of the Interstate Transit, Inc. (Colonial Stages), which operates a great bus network extending from the Great Lakes to Florida and from the Mississippi to the Atlantic Seaboard, makes the following statement:

"In developing this long haul, efficient bus service one of our first considerations was tires. Due to past experience in another operation, our natural choice was Goodrich, as we had to consider known tire quality and consistent performance.

"As you see from the territory covered, we strike about every conceivable kind of road and temperature condition. We are glad to tell you that Goodrich Tires have played an important part in helping us expand this operation and maintain our schedules."

The B. F. Goodrich Rubber Co., Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ont.

Goodrich HEAVY DUTY Silvertowns

• SPECIFY GOODRICH ON YOUR NEW BUSES •

START

STOP

START STOP

This is what street car operation is like. With Timken lowered starting and rolling resistance—starts are made smoothly like this  instead of jerking like this  and, stops like this  instead of this 

And in addition, maintenance costs are lowered. Loads, radial and thrust, are completely carried and enduring service is entrusted to Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken steel, exclusively combined in Timken Tapered Roller Bearings.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

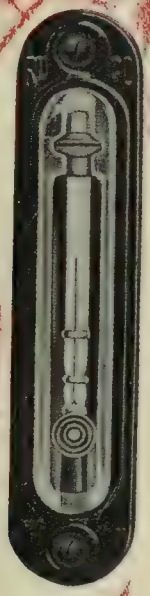
TIMKEN *Tapered Roller* **BEARINGS**

Ample Heat

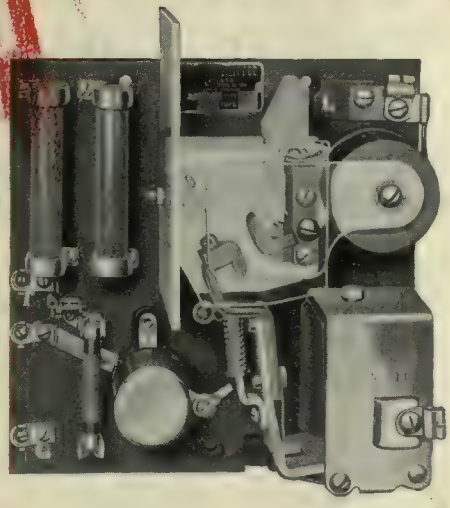
Car Comfort with Utility Heaters Regulators Ventilators



with the Utility Cross Seat Heater fitted with Cromalox Strips delivers 100 per cent output for the electric energy input. Listed as standard by the Underwriters' Laboratories.



properly controlled



and efficiently regulated

with the Utility Thermometer Control that keeps air in the car at uniform temperature for which it is set and the Utility Regulator which has been tested for 100,000 contacts and did not show damage to contacts or loss of accuracy in regulation.

means passenger comfort and profitable operation

Besides heat, clean, fresh air is a definite requirement for passenger comfort. Utility system of ventilation scientifically provides fresh, dustless air and ample circulation without wasting heating current.

Let us figure on your heating and ventilating equipment, either for new cars or for modernizing your existing facilities.

Car Comfort with Utility Heaters Regulators Ventilators

RAILWAY UTILITY COMPANY

2241 TO 2247 INDIANA AVE. CHICAGO, ILLINOIS

ANACONDA

from mine to consumer

REG. U.S. PAT. OFF.



HITENSO "BB" Trolley Wire

—an Anaconda Development

Where service conditions are severe . . . where traffic interruptions are costly . . . where the overhead wire is supported under elevated structures or along the ceilings of subways, the conductor must be strong enough to stand the stresses and strains of service for long periods without replacement.

For such exacting conditions Anaconda developed Hitenso "BB"* trolley wire. This copper-cadmium alloy has a minimum conductance of 82% and a wearing life almost two and one-half times longer than hard drawn copper. Yet it can be handled as easily as copper and by the same methods.

Investigate Anaconda Hitenso "BB" trolley wire. It has been thoroughly tested over a period of years and has made good in actual usage. We recommend it to the industry. Engineering data and complete information furnished promptly.

*Trade-Mark Registered U.S. Patent Office.



Anaconda safeguards quality from mine to consumer—provides a nationwide service, prompt, dependable, complete.

ANACONDA WIRE & CABLE COMPANY

General Offices: 25 Broadway, New York

Chicago Office: 111 West Washington Street

Sales Offices in Principal Cities

BUDA

SPECIAL TRACK WORK



—built to your specifications.

—offering lower installation costs through greater accuracy of design and construction.

—backed by 49 years' experience in building Special Track Work.

THE BUDA COMPANY

HARVEY [Chicago Suburb] ILLINOIS

Dig up your tracks



DAYTON OFFSET TIES

The use of Dayton Offset Ties shown above not only requires less excavation and less amount of concrete but affords greater reinforcement to the structure at points of greatest tensile strain. These points are at the top of the concrete and underneath the rails. (Note 2 reinforcing rods running longitudinally under each rail.)

THE DAYTON INTEGRAL SYSTEM OF

THE DAYTON MECHANICAL

for the last time...

Upon the permanence of concrete in track structure depends the life of the structure itself. In this question of structure life the whole problem of track maintenance is involved.

To achieve this permanence, each component part of the track structure — foundation, tie and rail must be welded into an integral whole in order that the impact of car wheels and traffic which introduces an element of force, is not allowed to destroy it. For concrete of itself cannot resist this force. Although it has compressive strength in abundance, it has little tensile strength and cannot be subjected to vibratory strain. Steel has tensile strength but it transmits vibratory strain and *vibratory strain destroys concrete.*

To set these elements up in your track structure without first providing for their protection is like putting the cat in with the canary with no barrier between. Dayton Ties provide this barrier. Destroying vibration is absolutely dissipated before it reaches the concrete by a special feature incorporated only in Dayton Ties. Permanency of the track structure is thus obtained — and permanency means low maintenance.

When you dig up your tracks—remember these facts. Relay with Dayton Ties *and for the last time.*



Send for your copy of this book

TRACK AND PAVING STRUCTURE

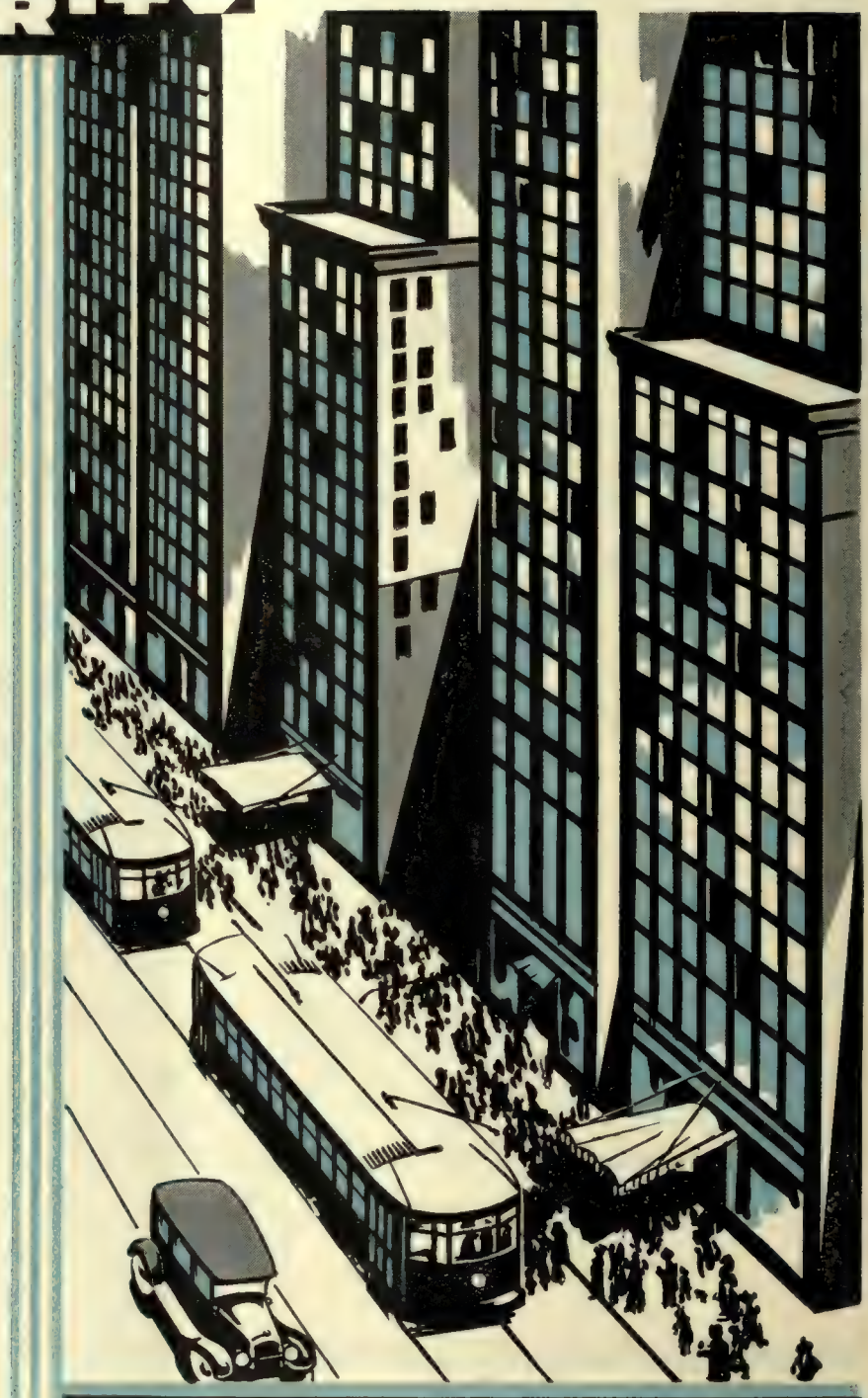
TIE CO.,-DAYTON, OHIO

BACK TO NORMAL

Buy generously... without Extravagance.
Save regularly... without Stinting.

These are the Signs of Good Times — Barron Collier

PROSPERITY



CAR CARD ~ ADVERTISING ALMOST ~ ~ EVERYWHERE

MAINTENANCE OF PROSPERITY

Constructive well directed advertising offers progressive business men substantial returns. It is a vital factor in the maintenance of prosperity.

Car card advertising is a business builder. Not only has it contributed to the success of national and local enterprise, but also, in so doing, it has worked constantly toward the maintenance of prosperity. Thus it has helped to induce a steadily increasing use of transportation facilities.

BARRON G. COLLIER INC. CANDLER BLDG. N.Y.C.

TO THE COAST
. . . *for the Convention*



Each Delegate may view the exhibits on his way to the Convention this year.

THIS year the A.E.R.A. Convention will be in San Francisco but the *Exhibits* will be in the Special June 14th Convention and Exhibit Number of *Electric Railway Journal.*

There will be no exhibits at the Convention. The latest improvements in machinery, parts and equipment, must be exhibited . . . pictured and described . . . in the advertising pages of *Electric Railway Journal's* Convention and Convention Report Numbers.

The editorial pages will tell of the trend and developments in equipment that are contributing, toward greater comfort, safety, speed . . . better appearance, operation and maintenance. The advertising pages will show what each manufacturer has to contribute toward these ends.

The Convention Number *will carry articles on:*

Improving quality of transportation by improving equipment. Electric railway properties in California. Trends in engineering designs: *Passenger comfort. Reducing noise. Less weight with equal strength. Increased speed. Lowering operating costs by improving car design. Lower initial and maintenance costs of tracks. Trackless Trolleys. Improved Design of Trucks. Advance in Substation Design-building, equipment, automatic control. Overhead and Line Equipment. Trend in Bus Design. Shop Equipment. Safety. Freight Equipment.*

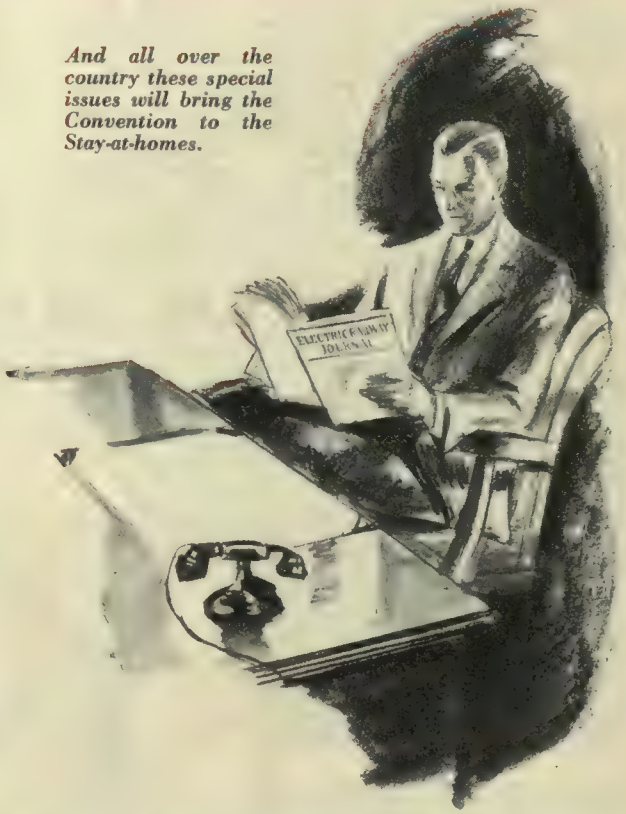
A. E. R. A. CONVENTION
San Francisco
JUNE 23-26

TO THE JOURNAL
. . . *for the Exhibits*

FOR the thousands who have to stay at home (unfortunately everybody can't go to San Francisco!) the Convention Exhibit and Convention Report Numbers of *Electric Railway Journal* will represent the exhibits, meetings, new developments, new business relationships, all the interest and enthusiasm that go to make up these annual meetings.

The fact that there will be no Convention Exhibits this year places a larger responsibility on *Electric Railway Journal*, but we feel certain of the whole-hearted support of manufacturers in our effort to place before the whole industry as complete a picture as possible of this year's Convention.

Remember! More than a million dollars a day is budgeted to be spent this year. Advertising should bring better results than ever before!



And all over the country these special issues will bring the Convention to the Stay-at-homes.

The Convention Report Number will carry the only full report of the entire convention meetings, discussions, resolutions, social doings, outstanding happenings, personals, etc., etc. It will be chock full of interest to those who attend as well as to those who stay at home, and will be retained permanently by many readers.

Electric Railway Journal

CONVENTION and EXHIBIT NUMBER

(FORMS CLOSE JUNE 4)

CONVENTION---REPORT NUMBER

(FORMS CLOSE JUNE 24)

NATIONAL

ARMATURE BABBITT METAL

TROLLEY WHEELS

"TIGER" BRONZE AXLE

AND

ARMATURE BEARINGS





Approved for City and Interurban Cars

The approval given National products has come from far and wide and recognition of National quality and economy is growing continually.

It is only natural that National products are so well received and so extensively used. Back of their manufacture is a story of research, development, and cooperation with the traction industry that determined the success of these products.

National products are highly economical from the standpoint of first and last cost. You can safely standardize on them in keeping with your modernization program.

Our specialists will be glad to confer with you and help you solve those problems.

NATIONAL BEARING METALS CORPORATION

More-Jones Division

ST. LOUIS, MO.

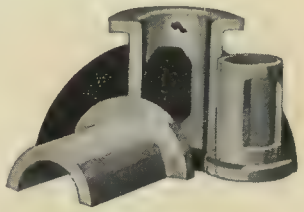
New York, N. Y. Jersey City, N. J. Pittsburgh, Pa. Meadville, Pa.
Portsmouth, Va. St. Paul, Minn.



Trolley Wheels and Harps

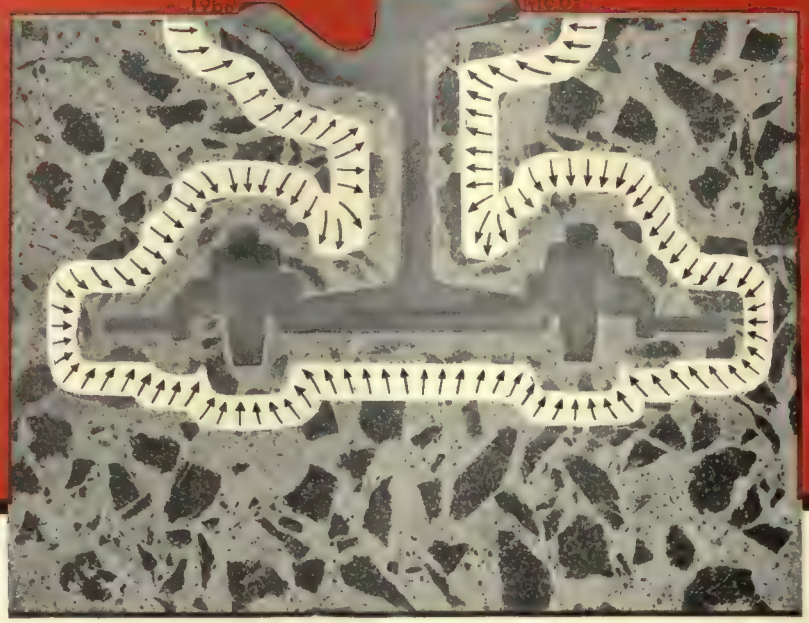


Armature Babbitt Metal



"Tiger" Bronze Axle and Armature Bearings

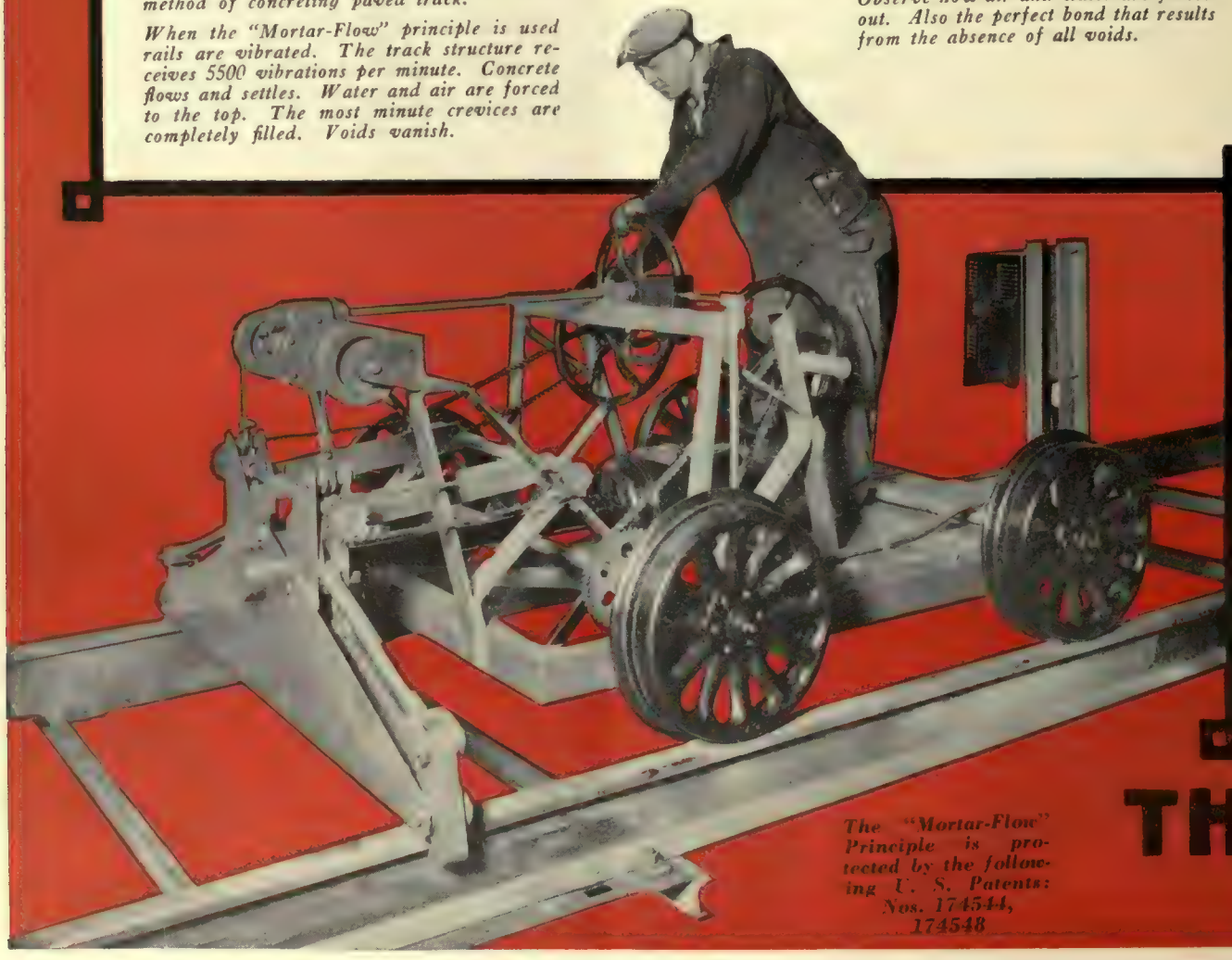
QUERIES BY ELECTRIC RAILWAY MEN



ABOVE: *Unretouched photo of rail and tie plate showing "Mortar-Flow." Observe how air and water are forced out. Also the perfect bond that results from the absence of all voids.*

BELOW: *This is the machine*—THE "MORTAR-FLOW" PULSATOR—*that has revolutionized the method of concreting paved track.*

When the "Mortar-Flow" principle is used rails are vibrated. The track structure receives 5500 vibrations per minute. Concrete flows and settles. Water and air are forced to the top. The most minute crevices are completely filled. Voids vanish.



The "Mortar-Flow" Principle is protected by the following U. S. Patents: Nos. 174544, 174548

THE

PROMPTED THIS ANNOUNCEMENT

"MORTAR-FLOW" IS NOW AVAILABLE

For all types of Track Construction

Here is the Plan

THE "MORTAR-FLOW" PRINCIPLE, as applied to paved track construction, was first developed for use with Steel Twin Ties, in order to obtain a better bond between rail, tie and concrete.

However, the "Mortar-Flow" Principle improves *any* type of paved track construction in which concrete has a part, either as paving foundation or track foundation.

High frequency agitation of concrete is recognized by leading Electric Railway men as a tremendous advance in track technique. They wish to gain the advantages of this method.

Many have inquired if it is possible to obtain the "Mortar-Flow" equipment—that gives to the concrete greater density and bonding strength—for track construction other than with Steel Twin Ties.

It is to meet this desire of Electric Railway men—and in answer to their inquiries—that we have formulated the following plan:

1. **The "Mortar-Flow" Pulsator may be rented for vibrating the concrete around track for any type of paved track construction.**
2. **The service makes available the machine—the "Mortar-Flow" Pulsator—suitable in gauge, rail and electric drive for the particular job. It also includes the services of our field engineer to instruct your track foreman and operator in its use.**
3. **The charge is a flat rental, based on the single track footage of the job and the amount of track to be vibrated.**

Complete information about the "Mortar-Flow" Principle is contained in "Uniformed Paved Track," the 1930 Paved Track Note Book. If you have not received a copy write for it.

Further details of our new policy will be gladly furnished upon request.

7% More Concrete

This type of Steel Twin Tie concreted with the "Mortar-Flow" method of paved track construction was installed by the Capitol Traction Company, Washington, D. C., in May 1929.

This track has been in operation about a year. Temperatures have ranged during that time from zero to 100° F. Yet, there is no indication of any separation between the rails and concrete.

It is interesting to note that—due to the greater density caused by the elimination of water and the filling of the most minute voids by the vibrating method — the actual amount of concrete needed was 7 per cent more than the estimated amount. (For details see Electric Railway Journal for March 1930, Page 130.)



INTERNATIONAL STEEL TIE CO.

CLEVELAND • OHIO

The I. R. T. and the B. M. T.

carrying 70% of New York's traffic

select Socony lubricants

NEW YORK'S two great subway, elevated and surface car systems — the I. R. T. and the B. M. T.—carry approximately 70 per cent of the total traffic in Greater New York. In 1929 an average of more than six million people a day depended upon these two systems.

Thus, it is imperative that schedules be maintained. The slightest delay is serious. Socony is proud that, for so important a factor in smooth operation as lubrication, Socony industrial and automotive lubricants were chosen to lubricate the power plants and rolling stock of these two systems.

We submit this additional example of Socony performance for your consideration in selecting lubricants.

SOCONY

INDUSTRIAL LUBRICANTS
AUTOMOTIVE LUBRICANTS

STANDARD OIL COMPANY OF NEW YORK





DETROIT DOES IT!

In the automobile center of the World, the Department of Street Railways, City of Detroit, maintains and operates a street railway track system *second to none*



Woodward Avenue, the show street of Detroit, looking Northward toward Grand Boulevard.

City of Detroit

DEPARTMENT OF STREET RAILWAYS

ADMINISTRATION BUILDING
ST. JEAN AND SHOEMAKER

OEL. A. SMITH
GENERAL MANAGER

WM. B. MAYO
CONSULTING ENGR.

COMMISSIONERS

JOHN J. BARLUM PRES.
JOHN J. GORMAN
FRANK COUZENS
R. O. LATHROP, SEC'Y

March 8th 1930

Mr. John B. Tinnon
General Sales Manager
Metal and Thermit Company
New York City, New York

My dear Mr. Tinnon,

Agreeable to your request, I am enclosing several photographs showing the Thermit welding process as it was applied in our track construction work on Grand River Avenue. I am enclosing, also, other photographs which you may feel free to use in anyway that you desire.

We feel that we have accomplished a great deal in our track construction work by concentrating our forces on major repair jobs, and during the past three years we have been able to completely rehabilitate seventy miles of track, thereby bringing our entire track structures to a point where they are in a high state of efficiency. At the time the lines were purchased from the privately owned company in 1922, the City's transportation system comprised 374 miles of track, while the system today operates over 433 track miles, or an increase of 59 miles.

The Department of Street Railways now operates 1635 street cars, and 551 motor coaches, serving an area of 145 square miles, and transporting approximately one and one-half million passengers daily.

Yours very truly,

OEL. A. SMITH
General Manager

25,000 THERMIT JOINTS help to give smooth, fast transportation in Detroit

Street railway transportation is a *growing* industry in Detroit. Track mileage has *grown* from 374 to 433 in the past seven years. An addition of 59 miles of track is certainly an indication of healthy growth. And much of the existing track has been rebuilt and modernized.

Thermit-welded joints are standard practice in Detroit on both new track and reconstruction. The accompanying chart indicates the way the use of Thermit has grown in Detroit as each succeeding year shows the superior quality and lowered maintenance cost of Thermit-welded track.



Job on Grand River Avenue, Detroit, completed with standard steel tie and Thermit welded joint construction.

THERMIT



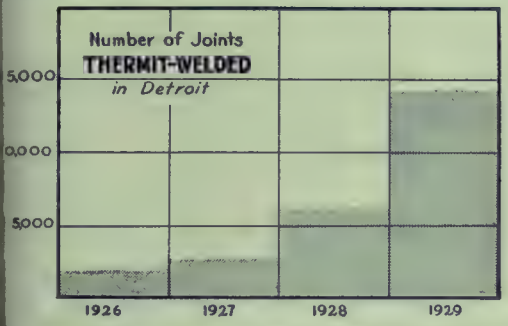
More of Detroit's fine cars are shown here. In spite of countless automobiles, Detroit's street cars carry more and more passengers each year.



Another view of Woodward Avenue, downtown section of the City of Detroit.



Thermit-welding Tee rail—workmen putting the moulds in place.



Starting with 1714 Thermit-welded joints in 1926, the Dept. of Street Railways has increased its use of Thermit every year. The total in four years is 25,009 Thermit joints. Of this total only 55 or 2/10 of 1% have failed, but there have been no failures on new rail.



Thermit-welding Tee rail—showing crucible in place, with charge.

Standard steel tie track construction costs in Detroit

Cost per mile double track	Material	$74,000.00
	Labor	46,000.00
	Total	$120,000.00

Rail and ties laid, lined, and surfaced—1,200 lin. ft. D. T. per eight (8) hours.

Thermit joints applied and ground—75 per eight (8) hours (21 men, 3 preheaters).

Concrete base, 8½″ deep, cost $7.00 per cu. yd. 1,200 lin. ft. D. T. per eight (8) hours.

Compressed concrete paving 5″ deep, $1.20 per sq. yd. 1,200 ft. D. T. per eight (8) hours.

Minimum labor rate $.60 per hour.



Thermit-welding Tee rail—after reaction has taken place, but before removing moulds.



Detroit boasts fine rolling stock. Modern cars, well maintained, operating on smooth-surfaced, Thermit-welded rails, give swift and quiet transportation

THERMIT



Reconstruction work in Jefferson Ave., Detroit. 2200 feet of new track laid and Thermit-welded beside the old without stopping cars.

Five miles of track rebuilt at $13,350 below the engineer's estimate

TWO and one-half miles of double track on Jefferson Avenue, Detroit had to be rebuilt under heavy traffic. The estimate was $200,000. The job was started May 16, and completed July 2 one and one-half months. The estimated cost was $200,000. The actual cost $186,652.39, a saving of $13,350.

On this job the report of Mr. P. A. Kerwin, Supt. of Ways and Structures, to the General Manager, reveals the unique time- and labor-saving methods used in replacing track. This method, it will be noted, was made possible by Thermit-welding the joints.

"The performance of this entire work," says the report, "within the estimated cost including those features not anticipated, as well as the dispatch with which the job was done, was made possible by the methods adopted, which I do not believe have ever been used elsewhere. The main feature was the setting up of a single track alongside the old tracks, which were kept in operation; which new section was completely tie-rodded, Thermit-welded, and ground while in this position. During the night, in the period of forty minutes service (between 1.00 and 3.00 A. M.) the old rail was cut out with acetylene torches and the new track slid into place. At the start of the job we put into place 1500 foot sections of single track; at the close of the job we were putting in 2200 foot sections "

The Metal & Thermit Corporation's engineers are experienced and practical track men. They may be able to show you ways and means of saving money. Consultation and estimates gladly furnished without obligation.



Jefferson Ave. job after new track had been slid into place over night.



Same job, showing method of concreting using two mixers simultaneously on opposite sides.

THERMIT

METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO



Wire entanglements that developed the rectifier

For four long years, wire entanglements isolated neutral Switzerland. Copper could not get through. Rotating converters that required large quantities of copper were almost impossible to manufacture.

In that time of wire entanglements fifteen years ago, the steel-jacketed, large-capacity, mercury arc power rectifier was developed to the point of commercial practicability. True, the failures were numerous and costly; the experimentation still more costly; but they were cheap compared with copper.

As a result, the mercury arc power rectifier of today is twenty years ahead of the position it would have occupied in a normal peace-time development. The rectifier stands today a perfected, dependable, commercial product.

AMERICAN BROWN BOVERI CO., INC.
CAMDEN, N. J.

AMERICAN BROWN BOVERI



US RUBBER

The Big Swing
is to U. S. Tires

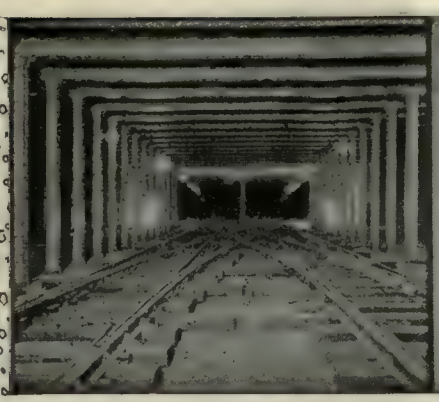


THE LANG TRANSPORTATION COMPANY
OF LOS ANGELES

—Another great Bus Fleet
recently equipped with the

U. S. ROYAL
HEAVY SERVICE

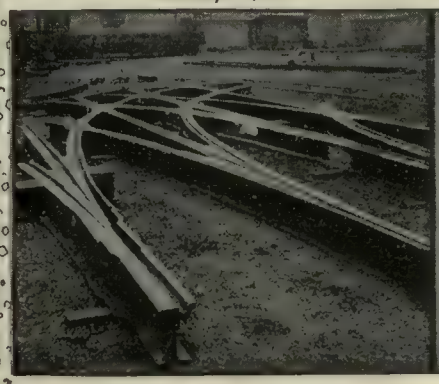
UNITED STATES RUBBER COMPANY WORLD'S LARGEST PRODUCER OF RUBBER



Subway Layout



New Wharton Scientifically Designed Crossing



Surface Layout



The New Wharton Switch

Maintenance Costs are Lower with WHARTON Special Trackwork

BECAUSE dependable, soundly engineered special trackwork reacts so favorably on earnings, leading railway companies specify Wharton Trackwork . . . of TISCO Manganese Steel.

Whether your trackwork requirements are for complicated layouts, for subway or surface lines, steam crossings, slotted work, or for only a single piece, Wharton Special Trackwork will enable you to keep each item of maintenance at a minimum.

Send for complete details relative to Wharton trackwork specialties...or consult with Wharton engineers on any special trackwork problem.

William Wharton Jr. & Co., Inc.

EASTON, PENNSYLVANIA

SALES OFFICES: Pittsburgh Chicago Houston Montreal New York
Philadelphia Boston San Francisco Scranton Los Angeles

GUARD RAIL CLAMPS

INSULATED AND NON-INSULATED GAUGE RODS

WHARTON-O'BRIEN INSULATED AND ADJUSTABLE PULL AND LOCK RODS



TULC *will*

1. Reduce the Number of Your Hot Bearings.
2. Save in the Cost of Your Maintenance.
3. Lengthen Your Oiling Periods.



Tulc is the true maintenance lubricant. Only TULC — made especially for lubrication of electric railway equipment—can give you these results.

It stays put—doesn't drip or run off—does a real job of lubricating. It definitely reduces maintenance costs. Make a test of TULC.

The UNIVERSAL LUBRICATING CO.
Cleveland, Ohio



Quality Products

Roebling

Electrical Wires and Cables give assurance of satisfactory power and lighting service from producer to consumer. Experienced workmen; carefully controlled processes of manufacture from copper bar to finished product; forty-five years of research development and production have made Roebling Electrical Products a standard of quality and reliability.

Large stocks of finished material are carried in our warehouses throughout the United States in order to provide "demand" service to our customers. We list a few of our products:

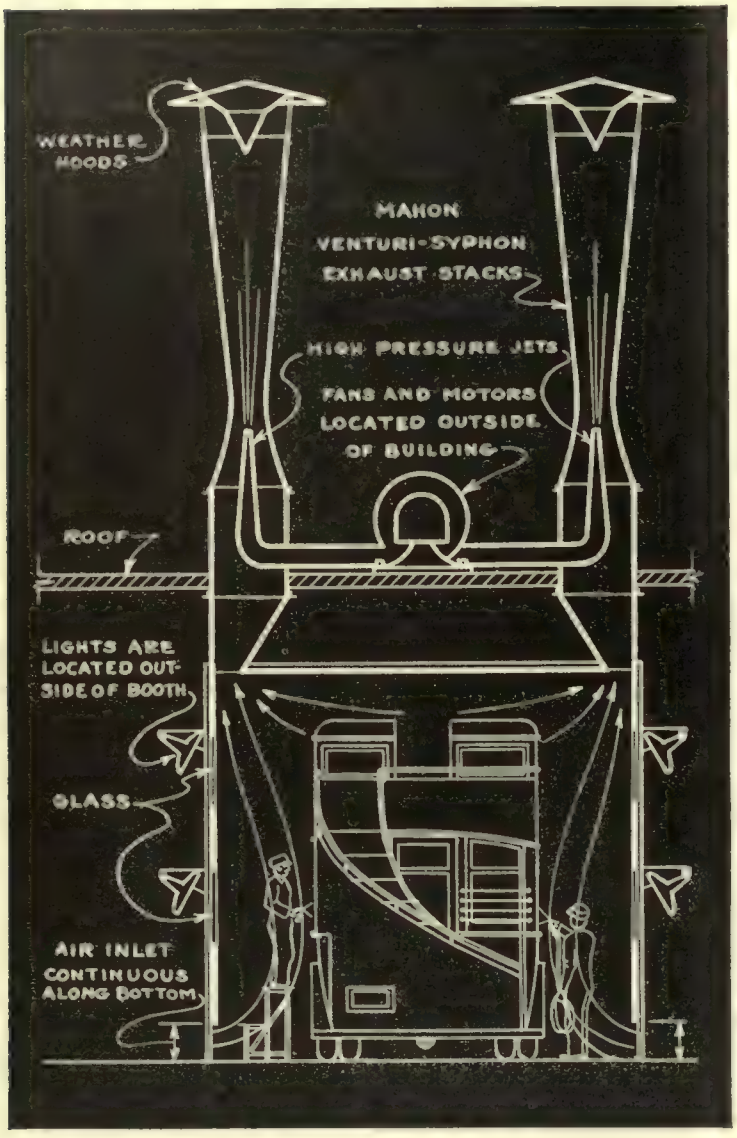
Arc Welding Electrodes
Gas Welding Wire
Electric Arc Welding Machine and Trailing Cable
Electrode Holder Cable
Power Cables for Overhead and Underground Transmission
Magnet Wires

ROEBLING
ELECTRICAL WIRES & CABLES

John A. Roebling's Sons Company Trenton, New Jersey

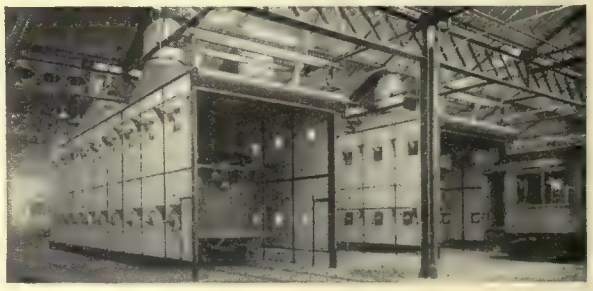
Cut Refinishing Costs Over 50%

With this Modern Spray Painting Equipment



Reduction in labor cost . . . reduction in out-of-service time . . . reduction in reserve rolling stock . . . smoother, more durable finish . . . these are the advantages of Duco or other lacquer finishes when you are equipped with proper facilities for rapid application. ¶ Spray Booths are not a standardized commodity . . . they must be designed to meet the requirements of the object to be painted, and the existing conditions in the individual paint shop. The layout of your paint shop and the design of your Spray Booths demands the services of Mahon Specialists. On the ability of these Spray Booth Specialists depends the fire safety of the installation, the degree of efficiency, and the cost of operation. ¶ Mahon engineers are available to you, and will gladly lay out the most efficient, most economical Spray Booth installation obtainable for your particular requirements. Mahon Spray Booths are now in operation throughout the United States and Canada, France, South Africa, Australia, Brazil, Java and the Argentine. You are invited to arrange a consultation with Mahon engineers at your convenience.

THE cross section drawing above shows clearly the working efficiency of the Mahon principle in Spray Booths of special design for street railway and motor bus work. Mahon Venturi-Syphon Exhaust Stacks are capable of exhausting 600% more air, through the stack, than actually passes through the fan. Such economy in operation should receive due consideration in the selection of equipment of this type. At the right is a Mahon Spray Booth installation at the Niles Center Shops of the Chicago Rapid Transit Co.



THE R. C. MAHON COMPANY

DETROIT, MICHIGAN

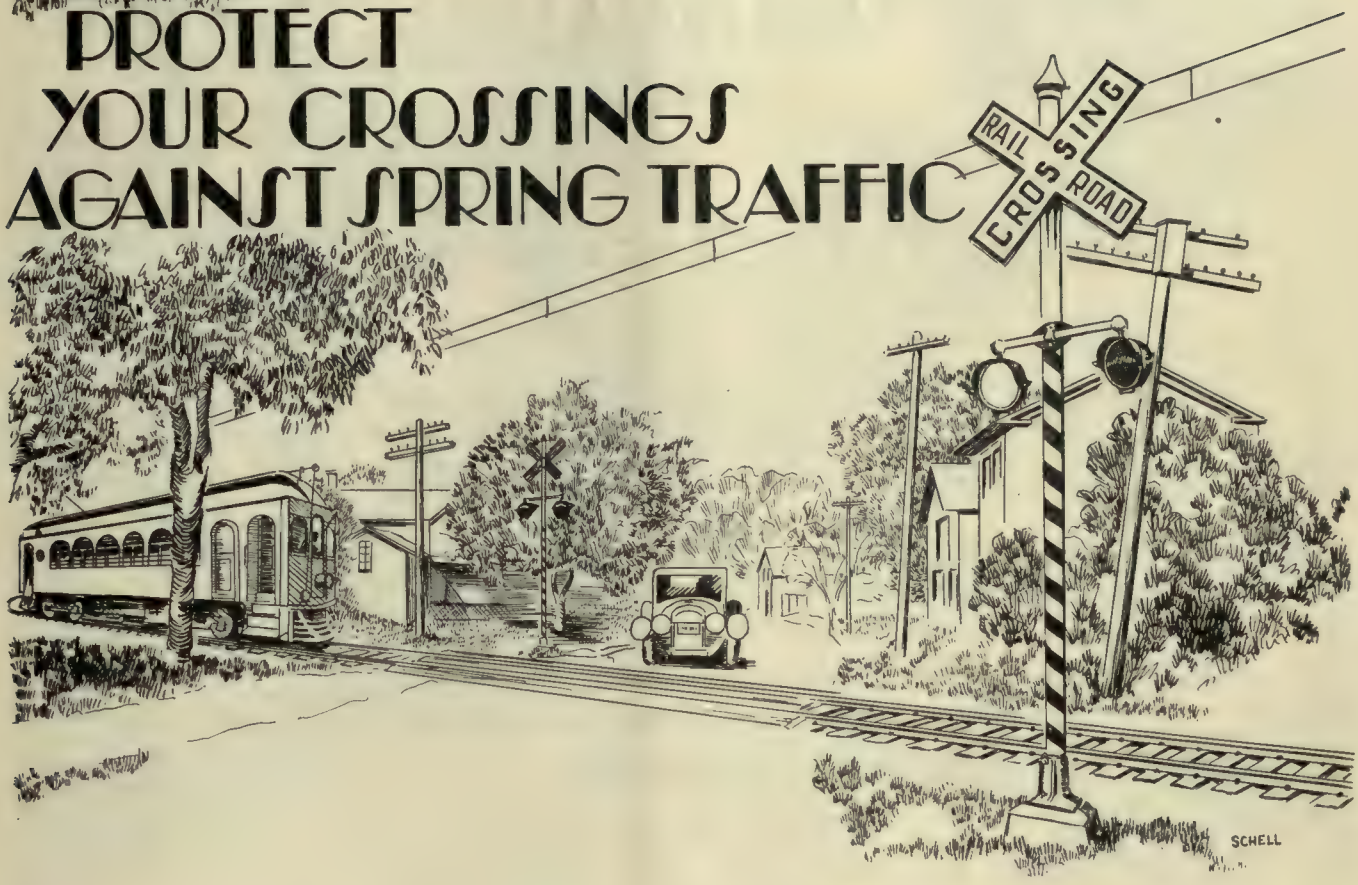
Manufacturers of Spray Booth and Exhaust Systems for every purpose.

MAHON

SPRAY BOOTHS & EXHAUST STACKS

DESIGNED FOR FIRE SAFETY

PROTECT YOUR CROSSINGS AGAINST SPRING TRAFFIC



The coming of fine weather will release a rush of vehicular traffic. And it will become necessary for the electric railways which traverse heavily traveled districts to provide some means of protecting the thousands of motorists who will be on the roads. Better protection for locations on thickly traveled or thickly populated districts could hardly be found than automatic signals.



"Union" HC-5 Highway Crossing Signals provide a surer protection than that afforded by watchmen or the manually operated crossing gate. "Union" Highway Crossing Signals are working every minute of the twenty-four hours and they relieve the crossing of the consequences which are likely to occur if a watchman fails. And their distinctive indications shout in a language all can understand: "A car is coming."

1881 TRADE MARK Union Switch & Signal Co. TRADE MARK 1930

SWISSVALE, PA.

27 Out Of 34

Placed Repeat Orders

Thirteen years ago we gave, gratis, 34 Tool Steel pinions to 34 different electric railway companies who had not before used them.

We recently checked up. Out of the 34 companies 27 have placed repeat orders. The 27 companies have purchased a total of 628 gears and 2,057 pinions.

Thus is shown the fact that 79% of the companies who accepted the trial pinion have ordered more. Not once but several times.

Surely such a recommendation proves Tool Steel Gears and pinions "best by test."

"Tool Steel" Gears Reduce Maintenance



The Tool Steel Gear & Pinion Co.
Elmwood Place, Cincinnati, Ohio

The Standard of Quality

TOOL-STEEL QUALITY
GEARS AND PINIONS

Another Development by LORAIN



THE DIXON TONGUE SWITCH

Lorain

GIRDER RAILS
GIRDER GUARD RAILS
PLAIN GIRDER RAILS
RAIL JOINTS AND TRACK ACCESSORIES
EXPANSION JOINTS FOR ELECTRICALLY WELDED TRACK
SPECIAL TRACKWORK
SWITCHES, FROGS AND CROSSINGS
in
Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail.

DURING the past 40 years, the name LORAIN has been identified with many important developments in track equipment. The Dixon Tongue Switch—developed by LORAIN—is a solid casting of manganese steel. In addition to the Tadpole Heel feature, the Tongue is held in place by means of the Heel Plate which is provided with a raised floor to carry the car wheels on their flanges over the tongue heel. This eliminates the usual pounding of wheel tread on heel of tongue in the trailing position.

The Heel Plate is made of heat-treated cast chrome nickel steel, which facilitates the building up of floor by electro-deposit welding. The hold-down bolts and nuts are sealed with asphaltum to exclude moisture. *Write our nearest District Sales Office for quotation.*

THE LORAIN STEEL COMPANY
JOHNSTOWN, PA.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL PORTLAND CEMENT COMPANY

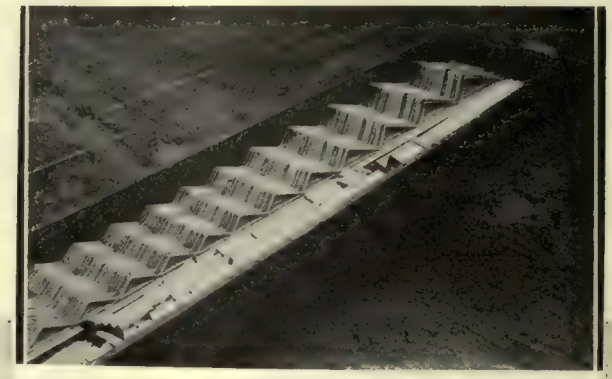
Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

Lorain Sales Offices—ATLANTA CHICAGO CLEVELAND DALLAS NEW YORK PHILADELPHIA PITTSBURGH

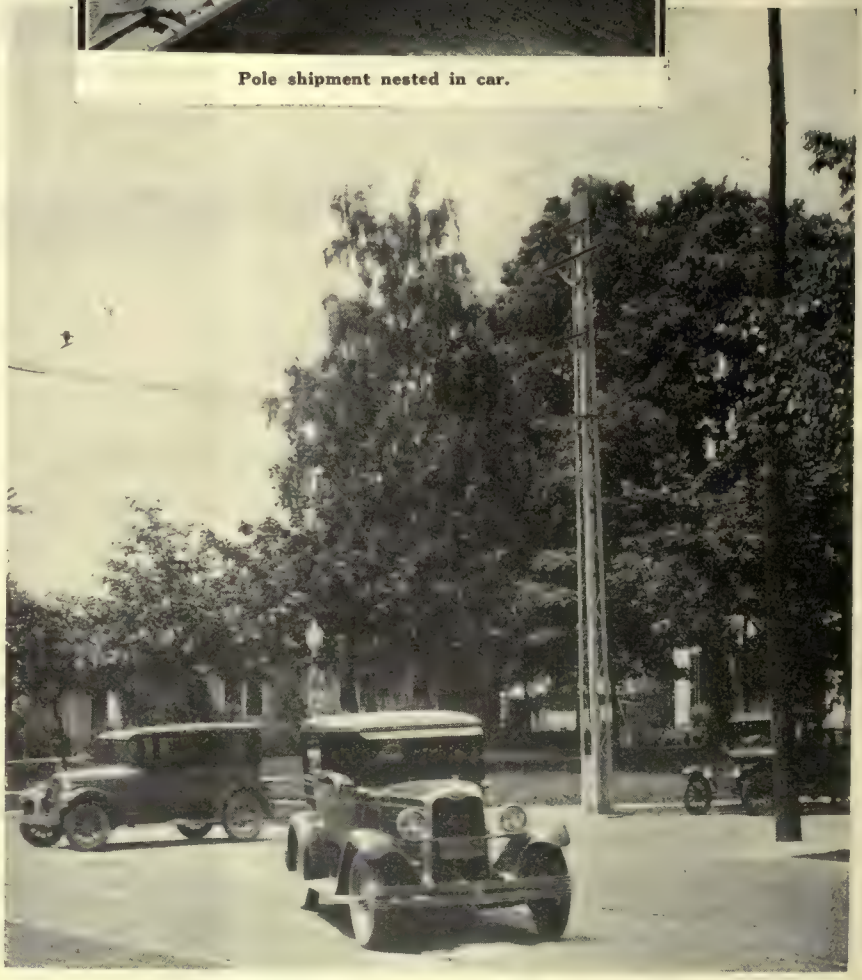
Walter Bates Steel

EXPANDED SQUARETRUS Trolley Poles





Pole shipment nested in car.



Combination power and trolley pole, Troy, Ohio

Four of the expanded angles shown above make one pole, including all lattice members.

Equally strong in all directions. Smooth surfaces, no bolt heads protruding.

Pole No. 10935—35′ 0″ overall weighs 414 pounds. Safe working load 1430 pounds.

Price, $20.65.

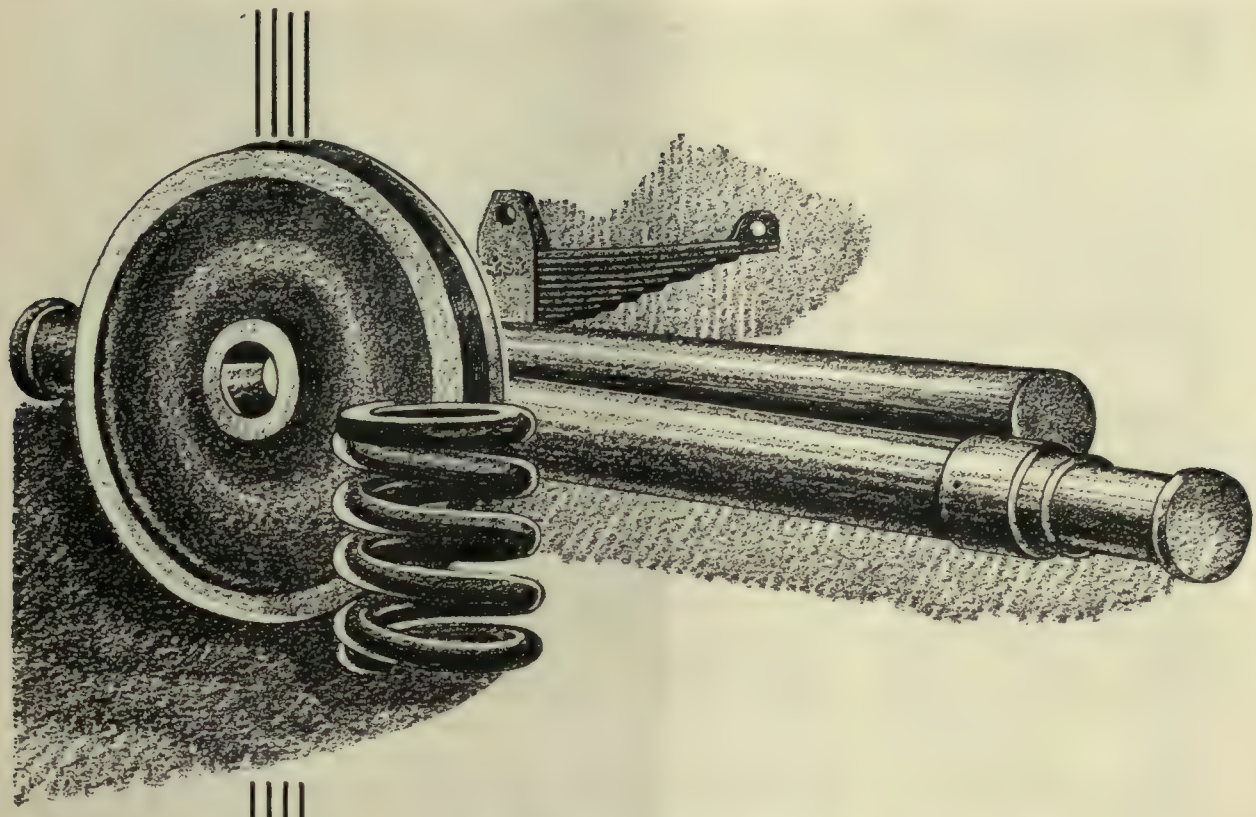
Complete line of accessories.

WALTER BATES STEEL
FLOOR GRATING
SUBSTATIONS
TOWERS
POLES

WALTER BATES STEEL CORPORATION

GARY INDIANA

Let us hear from you—you will promptly hear from us.



Bigger motors are needed for the fast starts which speed up city service. They put heavier strains on axles and armature shafts.

Reduce maintenance costs by specifying "Standard" Steel Armature Shafts and Axles for all equipment.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA. **WORKS: BURNHAM, PA.**

Products: Steel Axles Steel Springs Armature Shafts Rolled Steel Wheels

SALES OFFICES:

New York Chicago St. Louis Richmond Portland San Francisco



The figures above show a few of the many industries and the machinery manufacturers that use SKF anti-friction bearings.

IN EVERY INDUSTRY —*PREFERRED*

LOOK at the illustration of this advertisement again . . . nine representative industries . . . and in each SKF stands supreme. Forty-eight American railroads use SKF Bearings. Sixty-five airplane or aircraft equipment manufacturers use them. And in all the others, the manufacturers who build the machinery upon which these industries depend select SKF.

Why? Certainly not merely because SKF is the "Highest Priced Bearing in the World." Certainly not merely because it IS high-priced.

. . . But because the bearing-wise engineer insists upon getting the performance—the dependability—the real *economy* of "The Highest Priced Bearing in the World."

Nothing Is Apt to Cost So Much As the Bearing That Cost So Little

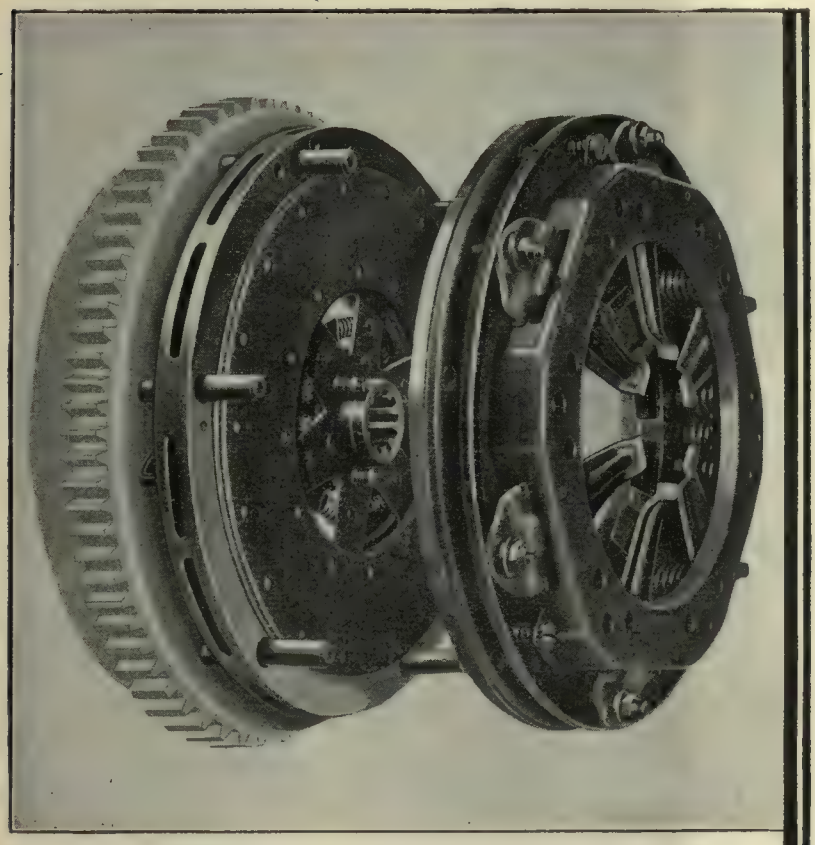
SKF INDUSTRIES, INCORPORATED

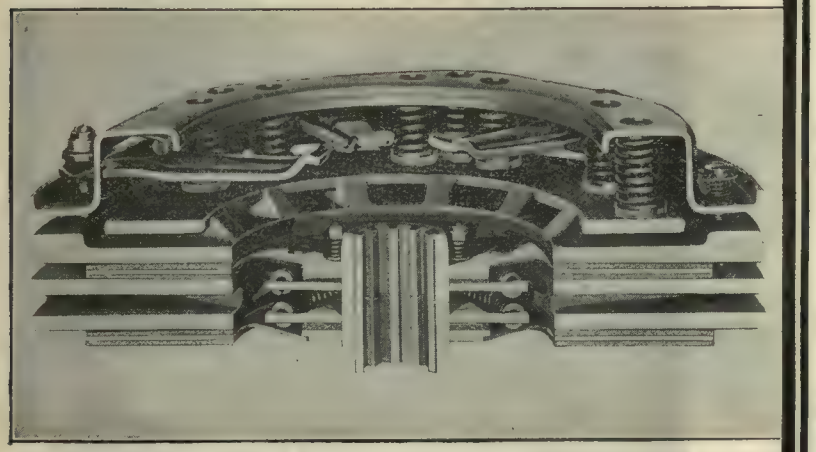
40 East 34th Street, New York, N. Y.

2147

SKF

THE HIGHEST PRICED BEARING IN THE WORLD





A NEW HEAVY DUTY DESIGN

FOR BUSES TRUCKS AND TRACTORS

LONG

AUTOMOTIVE CLUTCHES



AUTOMOTIVE RADIATORS

LONG MANUFACTURING COMPANY
DETROIT, MICHIGAN



SEAT MAINTENANCE
made easy

The operator who uses General Leathers for covering both bus and electric car seats doesn't have a very tough maintenance problem on his hands. The task of keeping them up to a high standard is comparatively simple.

Easily washed with soap and water, they are clean and fresh every day. The attractive colors are fast, maintaining the original interior color scheme for the bus throughout its life.

No repairs are needed for General Leathers. These durable coverings often last the life of the bus. In fact, General Leathers seem to improve with hard usage because these genuine leathers are specially tanned for constant rough service.

Specify General Leathers for new rolling stock, or order direct for replacements. On quantity orders hides are cut directly from furnished patterns to eliminate all waste. *Write for Samples.*

Our Specialties which we Recommend for this Purpose:

Majestic Full Grain Leathers
20th Century Spanish Leathers
Genleaco Leathers
Salon Hand Buffed Leathers

America's Largest Producers

GENERAL LEATHER COMPANY

Makers of Famous Tried and Proven "00" Leathers

NEWARK, N. J.

Detroit Office: General Leather Co., 413 Fisher Bldg.

West Coast Office: A. J. & J. R. Cook, Inc., 237 Eighth St., San Francisco.

London Office: R. & A. Kohnstamm, Ltd., 21 West Smithfield, London, E. C.

Canadian Office: Colonial Traders, Ltd., 78 Williams St., Chatham, Ont.



Illustration: The SIXTH STREET BRIDGE over Allegheny River at Pittsburgh, Pa., selected by a national jury appointed by AMERICAN INSTITUTE OF STEEL CONSTRUCTION as the most beautiful bridge completed in 1928.

The STRUCTURAL STEEL in the superstructure of this bridge was produced by Carnegie Steel Company, and FABRICATED and ERECTED by

AMERICAN BRIDGE COMPANY

Subsidiary of United States Steel Corporation

General Offices: 71 Broadway, New York, N. Y.

Contracting offices in New York, Boston, Philadelphia, Baltimore, Pittsburgh, Cincinnati, Cleveland, Detroit, Chicago, St. Louis, Minneapolis, Duluth, Salt Lake City and Denver.

Manufacturers of Steel Structures of all classes particularly

BRIDGES and BUILDINGS

Pacific Coast Distributors:
U. S. Steel Products Co., Pacific Coast Department
San Francisco, Calif. Portland, Oregon
Los Angeles, Calif. Seattle, Wash.
Honolulu, T. H.

Export Distributors:
United States Steel Products Company
30 Church Street, New York, N. Y.

"Our railway traffic is heavy —*our upkeep costs are light*"



A view of The Tampa Electric Company's trackage on Seventh Avenue, Tampa, Florida. Note the excellent condition of the flangeways and the smooth expanse of brick pavement adjacent to the tracks.

"Tampa is notably a city of brick paving," said Mr. F. E. Fletcher, General Railway Superintendent of The Tampa Electric Company. "And, as every traction engineer knows, the installation of street railway tracks in connection with brick paving presents some interesting problems.

"We use a special asphaltic cushion under the head of the 80-pound low-T-rail. This forms the flangeway, keeps the track area smooth, and eliminates the need of buying and applying special-shaped nose brick. Our traffic is heavy—unusually heavy—yet our maintenance costs are surprisingly low."

The "cushion," to which Mr. Fletcher refers, is a durable, asphaltic compound reenforced with asphalt-saturated fibre and preformed under pressure. *Carey Elastite System of Track Insulation*—used and recommended by street railway officials in almost two hundred cities, large and small. Investigate this modern traction improvement!

Carey Elastite

SYSTEM OF TRACK INSULATION

THE PHILIP CAREY COMPANY, *Lockland*, CINCINNATI, OHIO



Erected 28 years ago and still going strong

This feeder cable, erected 28 years ago by the Columbus, Delaware and Marion Electric Company, is a striking example of the reliability of aluminum cable.

Withstanding elements, for 28 years, this aluminum feeder has never been down—except once—and then a pole fell on it. The conductor is all-aluminum cable 397,500 cir. mils. The line potential is 600 volts.

28 years ago this aluminum feeder cable was the most economical line to buy and erect. Today, a similar line constructed of aluminum would still cost far less than any competitive material.

Is it any wonder that Public Utility Companies are using more and more aluminum feeder cable? Let us send you full particulars both about all-aluminum cables and A.C.S.R.—Aluminum Cable, Steel Reinforced. ALUMINUM COMPANY *of* AMERICA; 2463 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA

ALUMINUM

ALCOA ALUMINUM

ALL-ALUMINUM CABLE FOR FEEDER LINES



Alcoa Aluminum Bus Bars save 25 cents on every dollar in installations such as this

Where maximum efficiency in service from bus bars must be obtained, Alcoa Aluminum Bus Bars are the obvious choice for several reasons.

In the matter of first cost, Alcoa Aluminum Bus Bars are cheaper because, for the same current carrying capacity, their weight is only 48% that of other metals commonly used for this work.

In the matter of the erection of the bars, Alcoa Aluminum Bus Bars also bring substantial savings. In the first place their light weight permits the design and erection of lighter supporting structures. Then too, the work of bending and assembling is speeded up—the bars are worked with surprising ease and labor costs are materially reduced.

Another unique advantage of Alcoa Aluminum Bus Bars is that they have a much lower operating temperature than bus bars made of competing metal.

Tables of weights, carrying capacities and other technical data are contained in the booklet, "Aluminum Bus Bars". May we send you a copy? ALUMINUM COMPANY *of* AMERICA; 2463 Oliver Building, PITTSBURGH, PENNSYLVANIA.

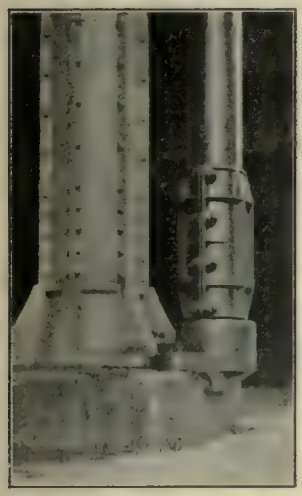
BUS BARS MADE OF

ALCOA ALUMINUM

Simplifying Tubular Pole Maintenance



"C" Clamp Supporting Pole Corroded at Base



"C" Clamp Holding Pole to Pole Step with Short Length of Pipe



"A" Clamp Installation

M.I.F. Accessories for Tubular Poles provide the desirable combination of simplicity, durability, economy in first cost installed, high salvage value, etc., for the following phases of maintenance operations:

Ground-Line Corrosion—*C-Clamps* are used for those cases where there is no factory sleeve, or where that sleeve may be readily cut off. This Clamp has uniform internal diameter throughout to fit each of the standard sizes of pipe used.

A-Clamps are used where there is nominal reduction of 1" in external diameter of pipe, from sleeve to pole. This Clamp has two internal diameters, the upper being smaller.

Upper Joint Corrosion—*A-Clamps* are used for reinforcement where the upper section is nominally 1" smaller in external diameter and the lower section is un-swaged.

B-Clamps are used where the reduction is less, the lower section being swaged, and averaging about $\frac{5}{8}$". This Clamp also has two internal diameters, the upper being smaller.

Corrosion in Pole Steps, or under Upper Collars—*C-Clamps* are used on bridges, etc., at corroded section—in some cases with short length of pipe of same diameter clamped in, replacing the corroded section.

Pole Top Extensions—*C-Clamps* in smaller sizes for extensions with pipe of same diameter, in street widening operations requiring raising of span wires, feeders, etc., at poles; also for supplementary circuits such as street lighting, traffic lights, etc.

A-Clamps similarly used with pipe 1" smaller.

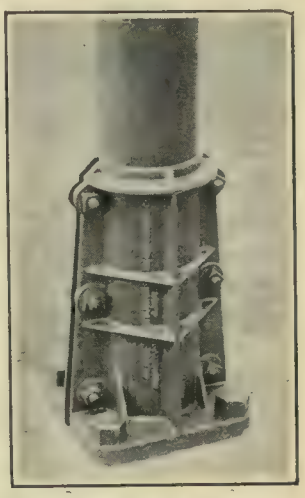
Temporary Construction—Build up poles of any required height from poles on hand, lengths of pipe and *C-Clamps* or *A-Clamps*. All material salvaged following grade changes, street widening, etc. Clamps may be used either top or bottom of pole.

Anchorage—*Williams Pole Mounts* will anchor poles on bridges, retaining walls or rock—for permanent construction also.

Send for Sales Bulletin No. 3, featuring Accessories for Tubular Iron Poles.



"B" Clamp Reinforcing Corroded Swaged Joint

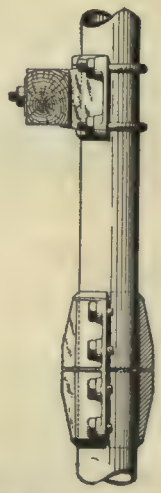


Typical Pole Mount Installation on Concrete

Other M. I. F. Pole Hardware Specialties of interest to the Street Railways are

Insulated Suspension Hangers with split insulators for signal conductors, traffic light cables, etc.
Span Hangers with knob insulators for two conductors spaced 8" apart, for service parallel or perpendicular to span wire.
Guy Hooks and Eye Nuts. Send for new Guying Specifications.
Crossarm Gains for attaching wood arms to tubular or wood poles.
Williams Pole Mounts for economical salvaging of wood poles, or for special new construction—such as on rock, bridges, retaining walls, etc.

Send for full data and samples of items in which you are interested.



"C" Clamp Extension and Gain Assembly

MALLEABLE IRON FITTINGS COMPANY

Pole Hardware Department

Factory and New England Sales Office: Branford, Conn.

Middle Atlantic States Sales Office: 30 Church St., New York, N. Y.

General Sales Agents elsewhere in U. S.

LINE MATERIAL COMPANY, South Milwaukee, Wis.

Canadian Manufacturing Distributor: Line & Cable Accessories, Limited, Toronto

Reduce maintenance

weldable,



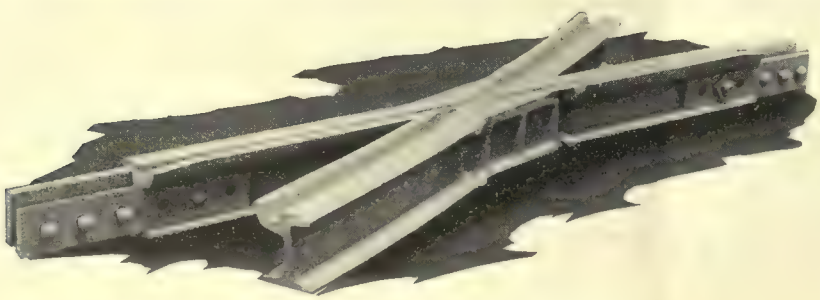
The illustrations below and at the left show the installation of a Bethlehem Silico-Manganese Three-way Turnout. This special work was assembled in Bethlehem's Frog and Switch Plant before shipment, as is all Bethlehem Special Work, making installation easy and assuring correct track alignment and perfect-fitting sections.

The wear-resisting Silico-Manganese frogs and mates used in this turnout will stand up under the impact of heavy traffic and have the added advantage of being easily repaired and built up on the job by any of the standard methods of welding.



Below are shown a Bethlehem Silico-Manganese Mate and a Frog, similar to those used in the turnout illustrated above. Bethlehem Silico-Manganese Mates and Frogs show remarkable shock- and wear-resisting qualities due to the Silico-Manganese steel of which they are made. The mates and frogs are of one-piece construction and can be easily welded to connecting track by any of the standard methods.





BETH

Silico-Man

with this *wear-resisting* trackwork

INSTALLATIONS of Bethlehem Trackwork at heavy-traffic intersections have demonstrated the ability of Silico-Manganese steel to stand up under continuous pounding.

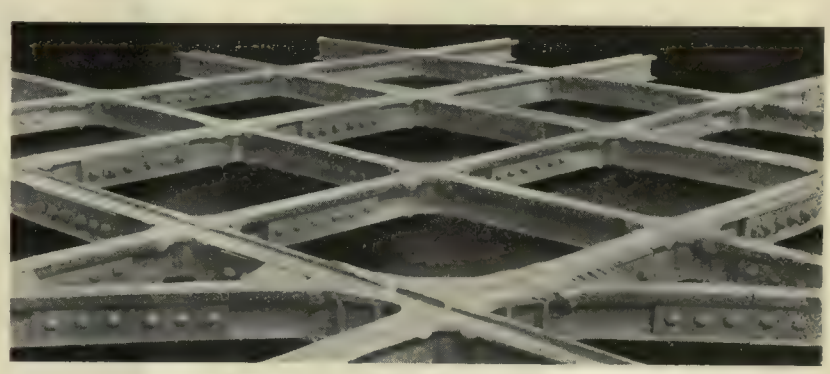
The wear-resisting properties of Silico-Manganese steel are well established. It is accepted as the standard for high-grade tools, such as punches, chisels, shear blades, etc., as well as for highest-grade automobile springs and other parts subject to shock and wear. Silico-Manganese steel of tool-steel quality, possessing great tensile strength, is used in the manufacture of this new trackwork.

The weldability of Bethlehem Silico-Manganese Trackwork has brought many new advantages. It is readily welded by any of the standard methods, such as electric-arc, oxy-acetylene and Thermit welding.

Bethlehem Silico-Manganese Trackwork can be installed at all heavy-duty locations with confidence that it will stand up—not only under today's traffic, but under the still greater traffic volume of tomorrow.



Bethlehem Silico-Manganese Crossing and Turnout installed at a busy traffic intersection in a large eastern city.



Bethlehem Silico-Manganese crossing assembled in Bethlehem's Frog and Switch Plant before shipment. Every crossing is assembled in well-lighted shops by careful workmen, assuring easy assembly and installation in the field.

BETHLEHEM STEEL COMPANY

General Offices: **Bethlehem, Pa.**

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City

LEHEM

ganese Trackwork-Design 1999

EARLL—

A name typifying the best - -



The name EARLL in the electric railway industry is associated exclusively with trolley catchers and trolley retrievers. Specializing on these two devices year after year, EARLL has produced devices which are superior in every detail.

Improvements and refinements developed by years of experience have made EARLL Trolley Catchers and EARLL Trolley Retrievers the best that money can buy.

✦✦ ✦✦ ✦

In 16 countries EARLL Trolley Catchers and Retrievers are giving the utmost in service with a minimum of attention and maintenance.

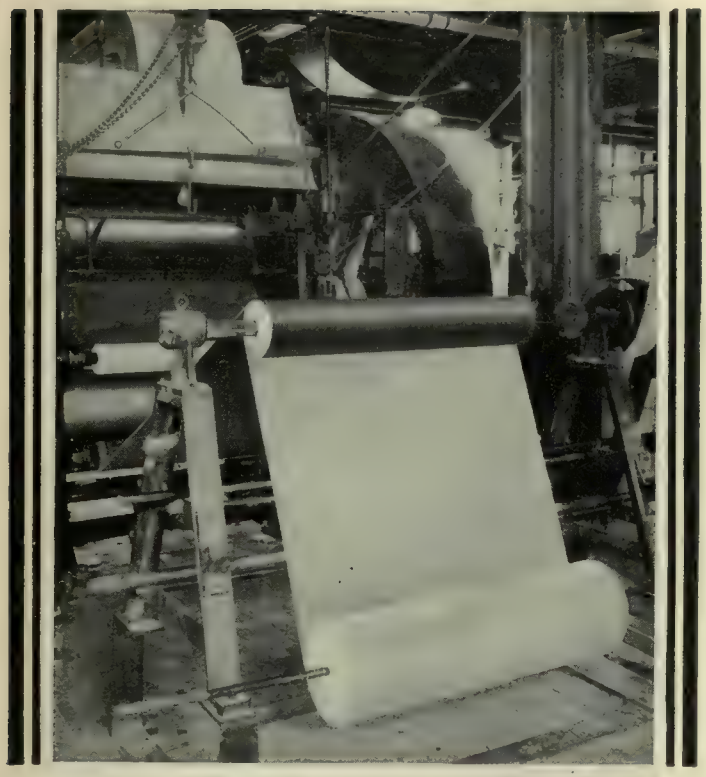
Simple—light weight—quick—certain in action, these two devices are indispensable to good trolley car service. They facilitate operation, make faster schedules possible, protect overhead, poles and rolling stock.

Fill the oil reservoir only once every 3 months.

General Foreign Agents
INTERNATIONAL
GENERAL ELECTRIC CO.
Schenectady, N. Y.
U. S. A.

C. I. EARLL
YORK, PA.
U. S. A.

In Canada
RAILWAY & POWER ENG.
CORPORATION
Ltd.
Toronto, Ont.



In the OKONITE factory, Dundee tape is frictioned in this heavy callender which forces the adhesive into and through the mesh of the fabric. The wide roll of frictioned material is then slit into suitable widths, rerolled and packed.

DUNDEE "A" FRICTION TAPE DOES NOT SEPARATE

IN addition to the ready adhesiveness of Dundee "A" friction tape, it has a definite homogeneousness that is rarely found in the lower price tapes.

The original process for making friction tape involved rubbing (frictioning) the adhesive compound into and through the mesh of cotton fabric by means of heavy callender rolls. From this process the product originally took its name.

But the high speed production of cheap tapes precludes the use of these frictioning rolls. In their place is substituted a spreading machine which merely surfaces both sides of the fabric with the sticky compound. The fault of this process is that the adhesive is not thoroughly worked into the fabric and may separate from it when the tape is unwound, leaving spots which are not sufficiently covered with the adhesive. Obviously, such a surfaced tape has not the permanent adhesive qualities of a friction tape made by the frictioning process.

Dundee "A" friction tape is a true friction tape made by the frictioning process, and the adhesive will not separate from the fabric under any condition.

OKONITE PRODUCTS

Okonite Insulated Wires and Cables

•

Varnished Cambric Cables

•

Okonite Insulating Tape

•

Manson & Dundee Friction Tapes

•

Okocord

•

Okoloom

OKONITE-CALLENDER PRODUCTS

Impregnated Paper Cables

•

Super-tension Cables

•

Splicing Materials

THE OKONITE COMPANY

Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC.

Factories: Passaic, N. J. Paterson, N. J.

SALES OFFICES:

NEW YORK CHICAGO PITTSBURGH ST. LOUIS BOSTON ATLANTA
BIRMINGHAM SAN FRANCISCO LOS ANGELES SEATTLE DALLAS

Novelty Electric Co., Philadelphia, Pa.
F. D. Lawrence Electric Co., Cincinnati, O.

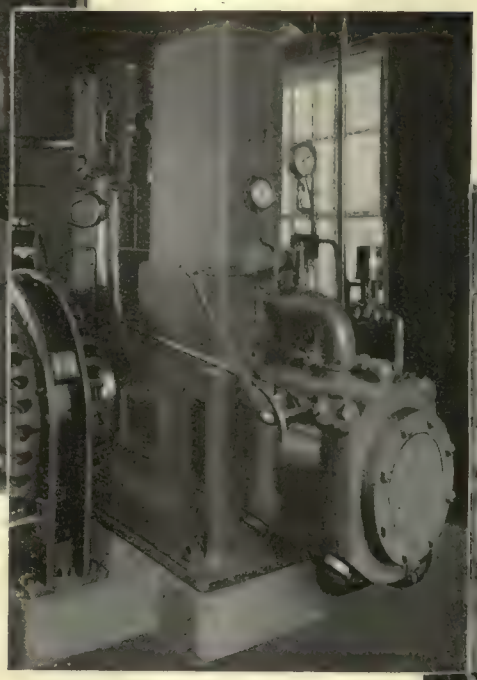
Canadian Representatives:
Engineering Materials, Limited, Montreal

Cuban Representatives:
Victor G. Mendoza Co., Havana

OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

Drilling holes through 2-in. planks at the rate of two a minute.





Sullivan Balanced Angle Compressor, direct connected, at work for one of the largest city railways in the world.

Two men with paint sprays paint a car in one hour.



where Air Power backs service to 650,000 car riders daily

FIFTEEN ways to speed up car and bus repairs, and reduce track maintenance costs, with air power—are illustrated by one of the largest city railways in the world.

Before air paint guns were used in the shops, two men with brushes used to paint a car in eight hours. Now they do it with paint sprays in one hour.

Air drills bore 26 holes through 2-in. platforms in 15 minutes; and 66 holes an hour for the platforms of steel cars.

Compressed air grinders, riveters, rivet cutters, and numerous air hoists are also at work.

Air tests brake valves, and pneumatic doors; and works in gas furnaces and soldering torches. Sandblasting and cleaning apparatus are other possibilities.

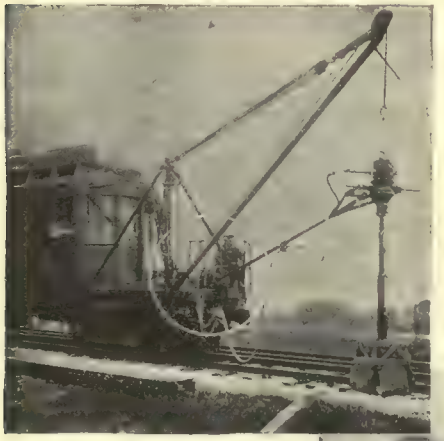
One of the Sullivan compressors is a single stage unit installed 21 years ago. The other is a modern Sullivan Balanced Angle Compressor.

The flexibility and convenience of air not only cut labor costs for the railway—but they may reduce the investment in rolling stock.

Even a small compressor, such as the Sullivan belted 68-ft. machine will earn a substantial profit. Sullivan Compressors are available to 5100 feet capacity, for all drives.

For track maintenance, Sullivan Portable Compressors, Rock Drills, Concrete Breakers, Clay Spaders, and Portable Hoists are available to suit all conditions.

Send for these Booklets 83-R, 83-W, and "Speed Up With Air."



Setting a pole with a sullivan Portable Air Hoist 345-lb. models will lift a ton on single line, or pull a 50-ton car on level track.

SULLIVAN TRADE MARK

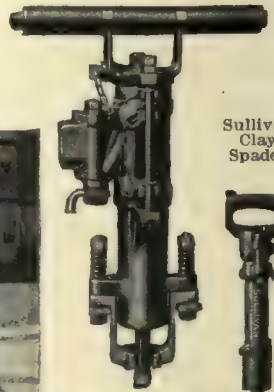
Sullivan Machinery Company

809 Wrigley Bldg., Chicago

Offices in all principal cities of the world



Sullivan electric protable compressor, speeds up track work for United Electric Railways Co. Sullivan Portables are available in 66, 110, 120, 160, 175, 220, 240, 310 ft. sizes; all mountings.



Sullivan 39-lb. Rock Drill



Sullivan Clay Spader



Sullivan Concrete Breaker

GARY

WROUGHT STEEL WHEELS





Are made to meet the most Exacting Conditions to which Modern Transportation is subject

Illinois Steel Company
Subsidiary of United States Steel Corporation
General Offices
208 South La Salle Street ... Chicago

"NOTHING SUCCEEDS LIKE SUCCESS"

• • •



That is an old saying that well applies to Art Rattan Seats for use in street cars. The success of Art Rattan Seats is proved by their steadily increasing use in the bus field. Now manufacturers of street cars find that Art Rattan Seats add definite sales value to *their* products.

Sturdy frames, smart tailoring, luxurious upholstery, greater comfort result from long seat building experience and a knowledge of what the car builder requires to meet car riders demands.

ART RATTAN WORKS, INC.

Builders of DeLuxe Bus Seats

CLEVELAND • • • • • • • • OHIO



Where Safety and Appearance Dominate

IN the heart of a busy city, where safety must be maintained at its maximum, there is nothing so important in the selection of electric line poles as the certainty of their strength and endurance. Another important factor, of course, is their appearance.

Both of these requirements are embodied in the tubular steel pole and reach their maximum effectiveness in NATIONAL Poles, because of their great strength and reliability under severe conditions of service and their clean cut, neat appearance which adds to rather than detracts from the built-up surroundings.

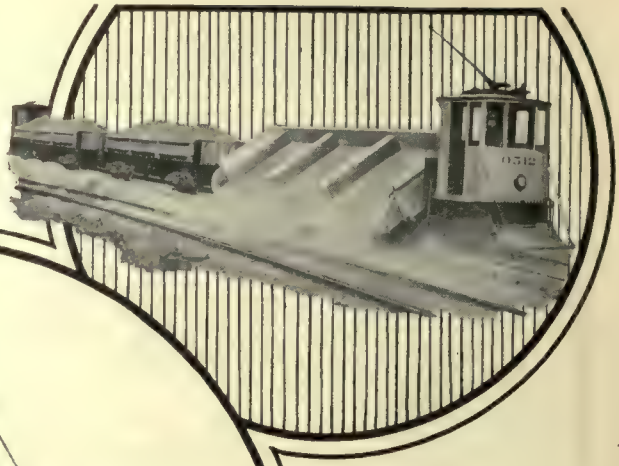
Wherever the factors of safety and appearance dominate, it will pay you to specify NATIONAL Poles. Made by the largest manufacturer of Tubular Products in the world, with facilities for meeting a wide range of specifications in pole construction. Ask for Bulletin No. 14—Tubular Steel Poles.

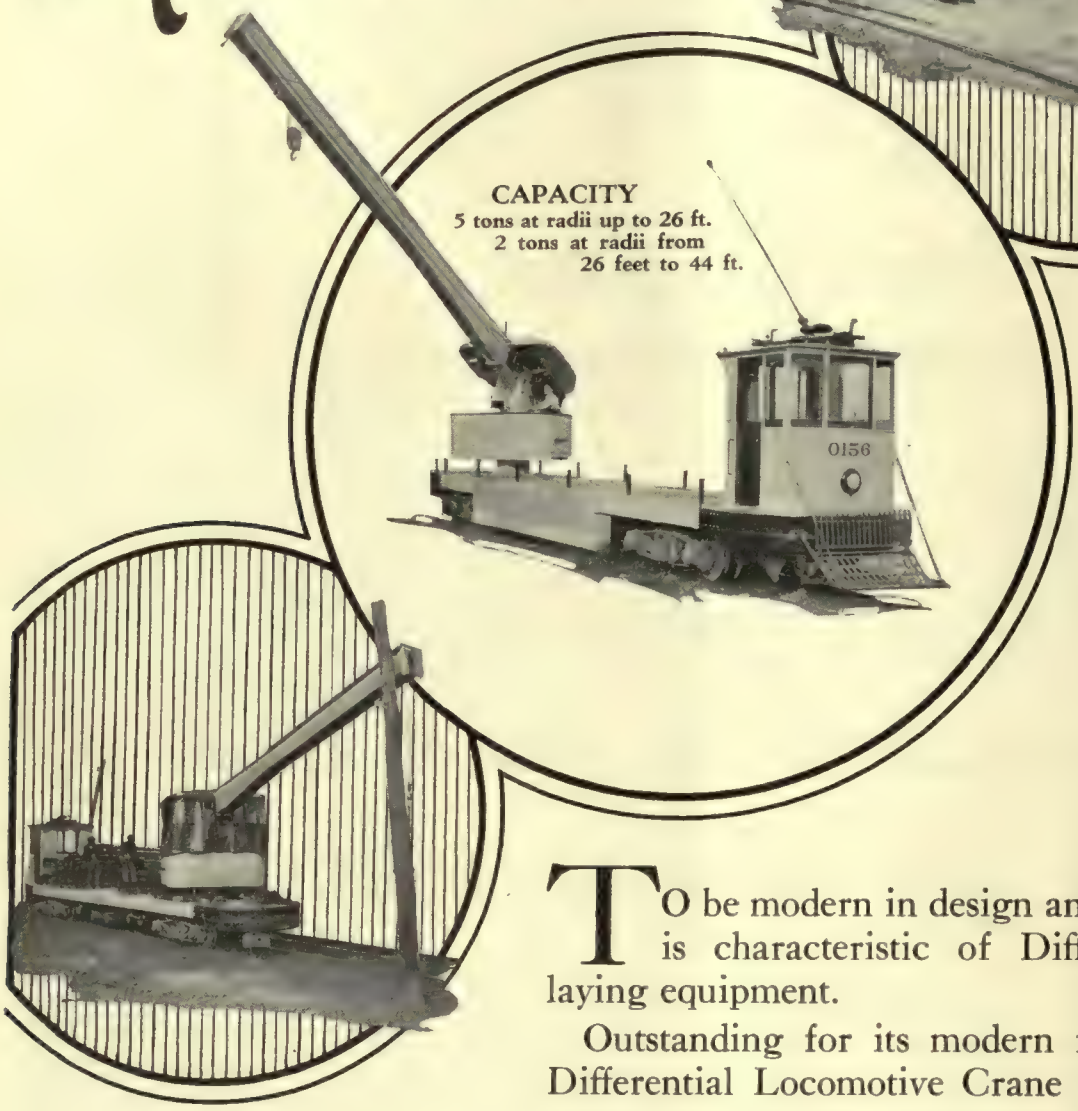
For additional protection against atmospheric corrosion use NATIONAL Copper-Steel Line Poles. Steel containing a small percentage of copper makes it more resistant to corrosion caused by alternate wet and dry conditions. The fact that tubular poles are constantly exposed to such conditions, makes the use of copper-steel particularly desirable for this purpose. Ask for Bulletin No. 11—Copper-Steel Pipe.

NATIONAL TUBE COMPANY • Pittsburgh, Pa.

Subsidiary of United States Steel Corporation

Modern





TO be modern in design and construction is characteristic of Differential track laying equipment.

Outstanding for its modern features is the Differential Locomotive Crane Car.

One man, from a revolving turret, controls the crane for any loading or unloading operation, for handling rails and bridge timbers, pole setting or special track work.

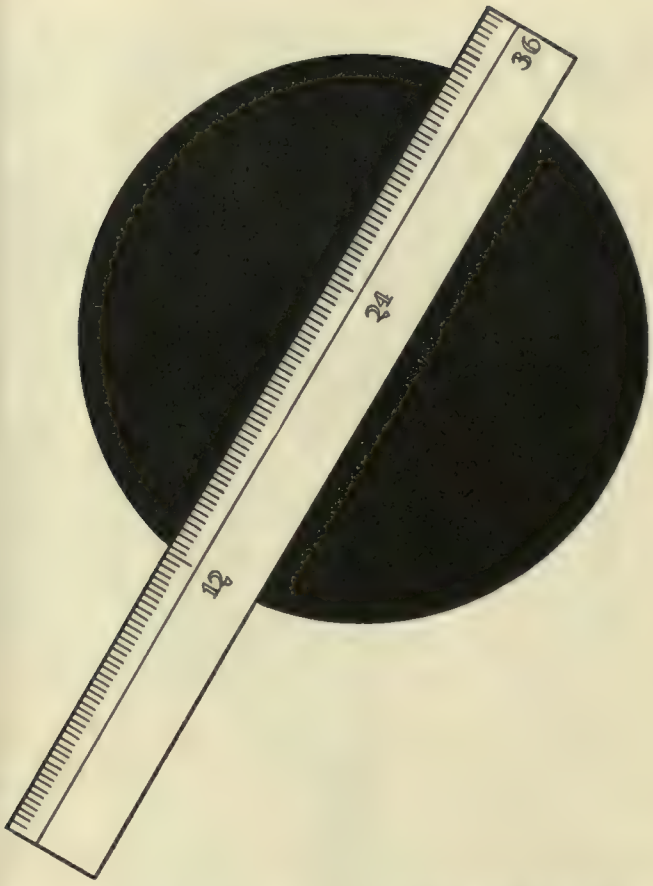
The Differential Crane is fast, conforms to Electric Railway clearances, does not impede traffic on adjacent tracks.

Equally modern are Differential Dump Cars, Differential 3-Way Dump Trucks and Clark Concrete Breakers.

Comparative cost records of representative Electric Railways prove that Differential modern equipment substantially reduces track laying costs.

THE DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO



Put your stopping ability to the yardstick test » »

On the assumption that every motor transport operator is vitally interested in making the quickest possible stops in the shortest number of feet, the Automotive Air Brake is recommended as the one method of control which offers these advantages with incomparably smooth, effortless operation and perfect safety.

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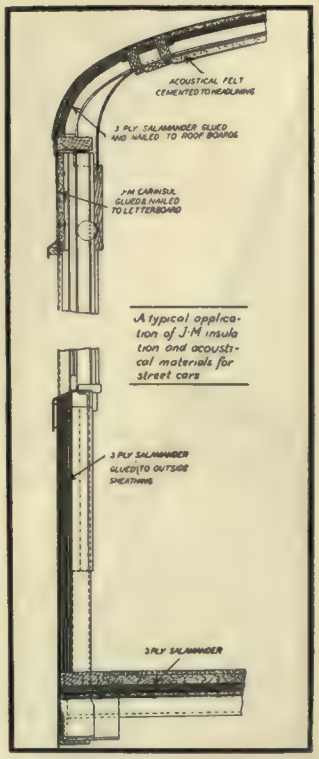
The Market Street Railways with the cooperation of the Publix Theatres and the use of J-M Insulation showed for the first time in moving picture history a talking picture in a street railway car. A schedule was so figured that the car would leave at a certain street at the beginning of the picture and make a complete circuit of the city of San Francisco, without stopping, arriving at the point of departure just as the picture ended.

"TALKIE"—a success on street car ... with Johns-Manville insulation

BY successfully presenting a talkie in one of their cars as it traveled through the noisy streets of San Francisco, the Market Street Railways demonstrated to the public in a dramatic way the new quiet that has been put into more than 100 of their old cars by the use of Johns-Manville Acoustikos Felt—a form of body insulation.

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A typical application of J-M insulation and acoustical materials for street cars

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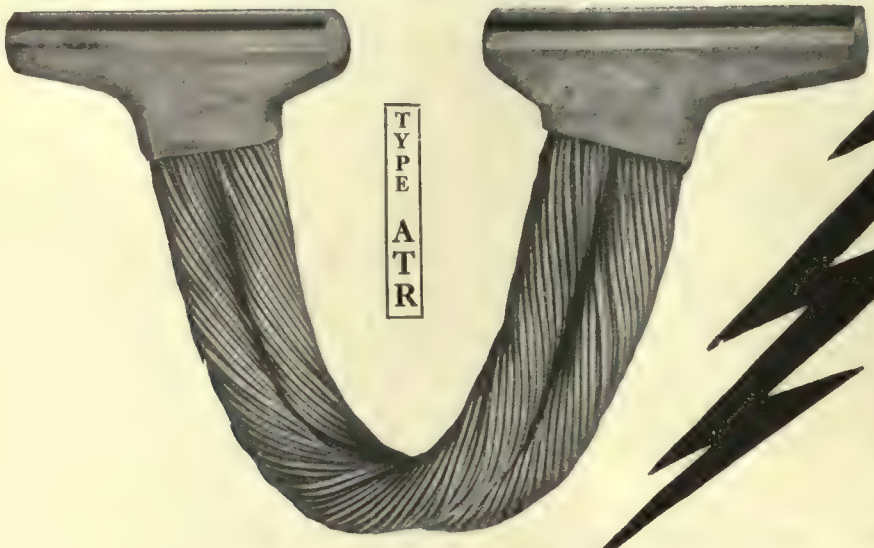
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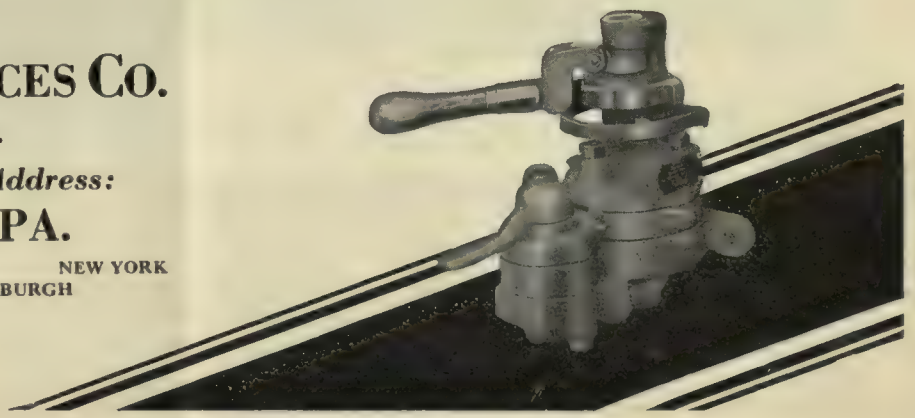
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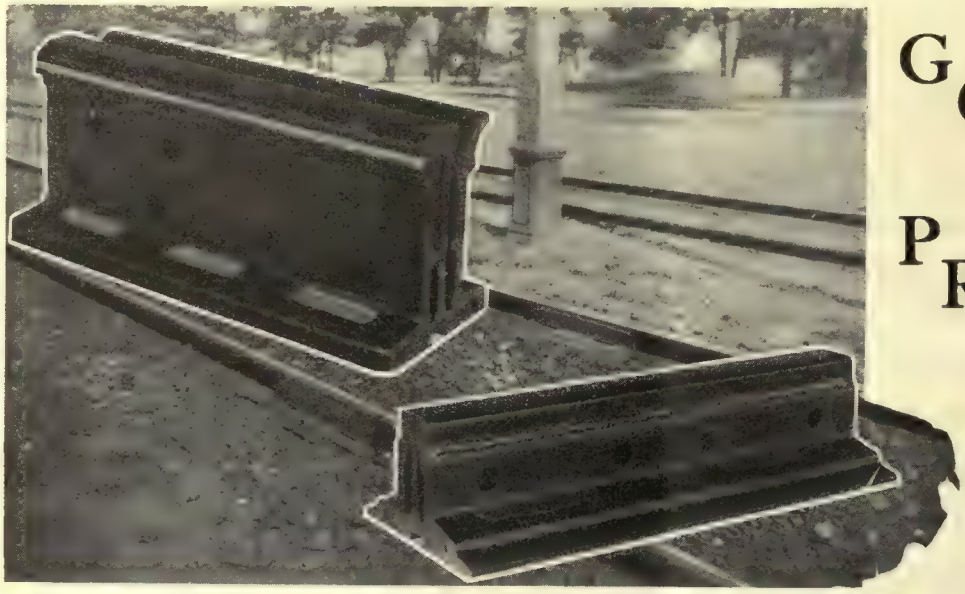
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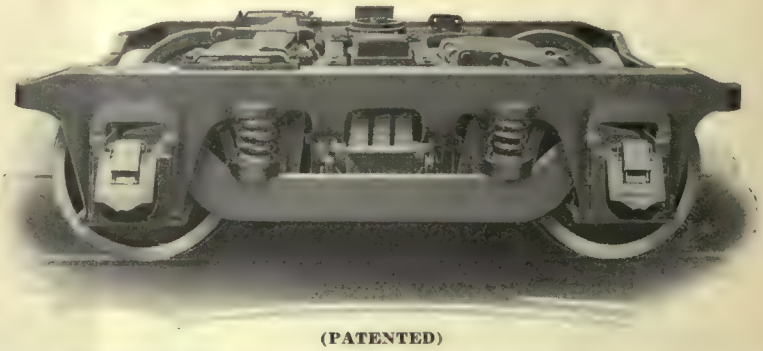
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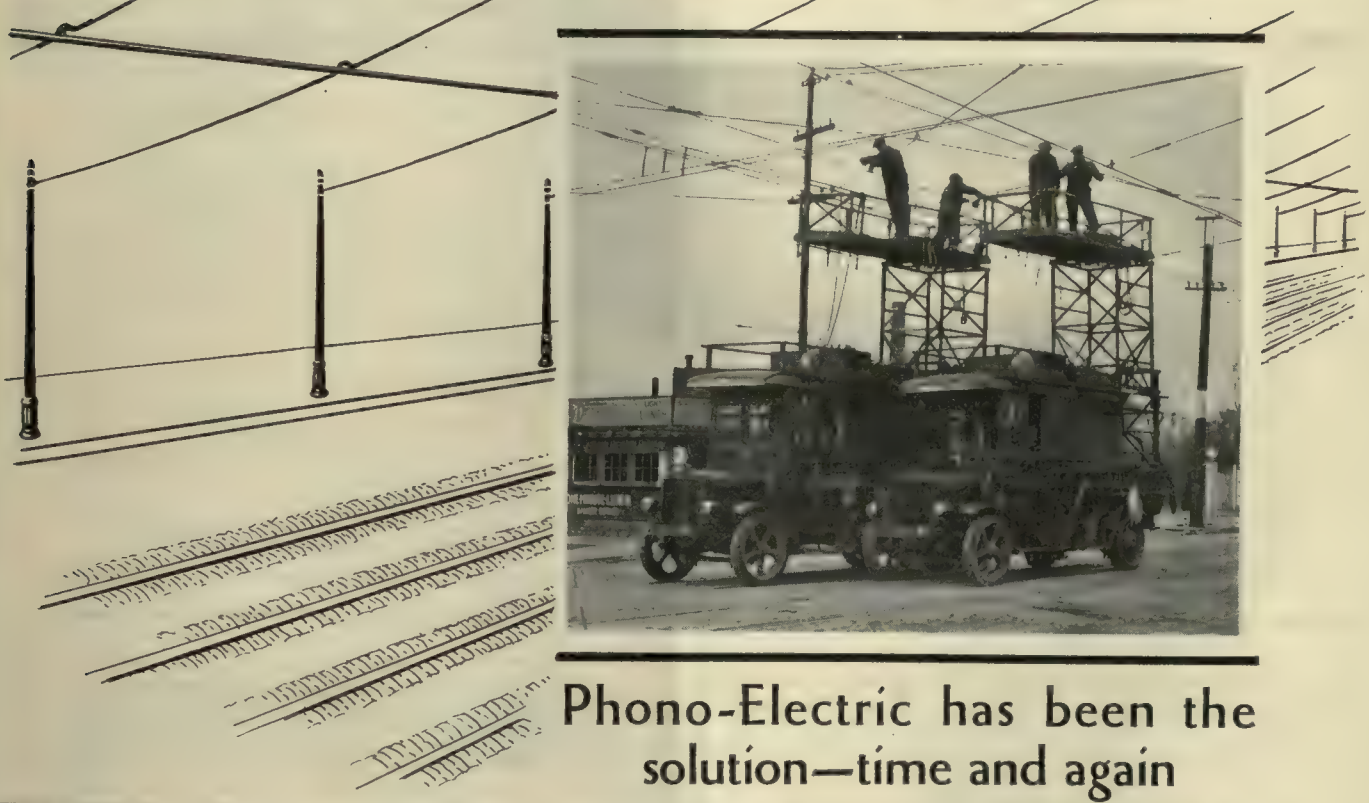
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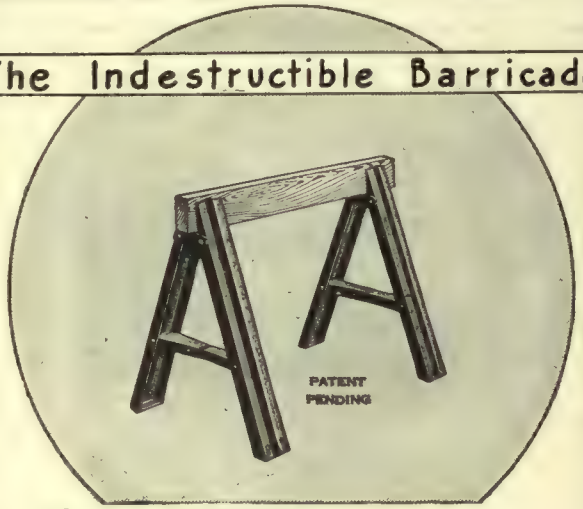
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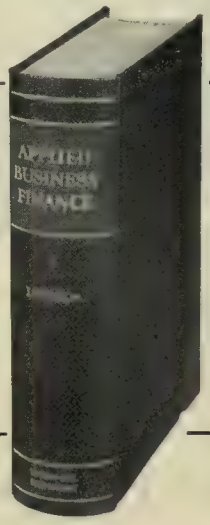
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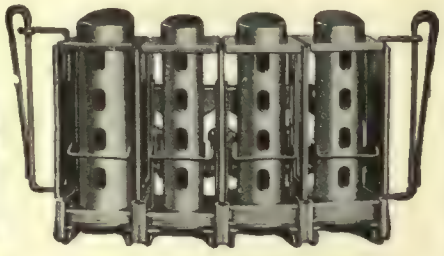


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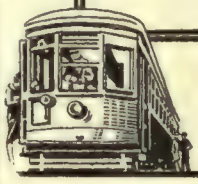
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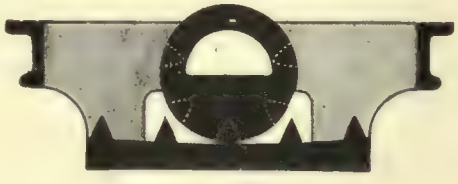
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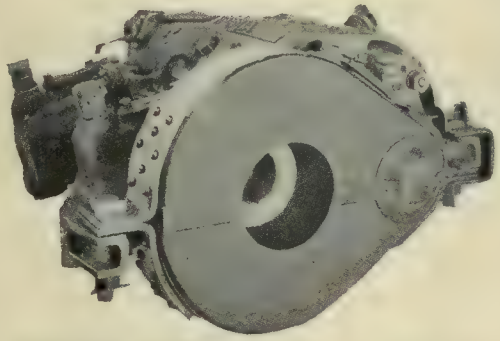
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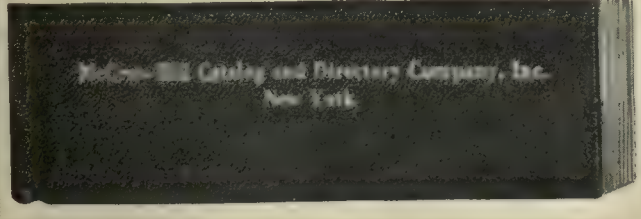
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May Issue Closes APRIL 16th

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Electric Railway Journal.

The P. Edward Wish Service

50 Church St., NEW YORK

Street Railway Inspection DETECTIVES

131 State St., BOSTON

A Personal Want—

can invariably be filled by a friend.

The Searchlight Section

of this issue covers the current business wants of the industries in which this paper is read.

For Every Business Want

"Think SEARCHLIGHT *First"*

A Business Want—

must be satisfied by someone in your industry.

GN-029

THERE'S A TRENTON TOWER *for Railway Work, too!*



From our forty-four years' experience we have built this Trenton Utility Tower to handle overhead construction on the railroads. It operates on ARA standard gauge track and has a wheelbase of 8 feet. Body platform 6 feet wide, 12 feet long and about 2 feet from top of rail to top of platform. Equipped with Brakes, Pin Couplings, and Rail Clamps so truck can be locked in position.

J. R. McCARDELL AND COMPANY

391-401 SO. WARREN ST., TRENTON, N. J.

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Increased heating efficiency, simplified assembly, absolute insulation from body, easy installation and low cost are the features of the new 2000 type Heater. Supplement B-4 mailed on request, contains a complete description.

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R.J.

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Address copy to the Searchlight Department
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Tenth Ave. at 36th St., New York City

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ENGINEERING draftsman having street railway track experience. Capable of making surveys and designs. P-207, Electric Railway Journal, 520 No. Michigan Ave., Chicago, Ill.

POSITIONS WANTED

SUPERINTENDENT maintenance or operation; 18 years experience street railway work. Now employed, desires change. Any location. Best references. PW-201, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation, broad experience, successful record dealing with labor, public, public officials, increasing revenue, decreasing operating costs. Excellent references. PW-205, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

WANTED, position as carhouse foreman, broad experience, best of reference. Will go anywhere. PW-206, Electric Railway Journal, Tenth Ave. at 36th Street, New York.

YOUNG man, four years with public relations and advertising department of large property, wishes change. Technical graduate, capable of establishing and managing department. Can go anywhere, on right offer, in thirty days. PW-204, Electric Railway Journal, 520 No. Michigan Ave., Chicago, Ill.

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Agents Wanted

For a portable high efficiency electric welder for street railway circuits. Portability such that one man can easily handle the machine on the street. Machine is provided with pneumatic tires and springs so that it can be towed for long distances at high speed. Current consumption from five hundred volt trolley is twelve amperes for two hundred amperes in the arc circuit. Normal welding capacity two hundred amperes; maximum capacity three hundred amperes. Write to the Economy Electric Products Co., 2400 Woodland Ave. Cleveland, O.

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MONARCH Machinery Company, 300 No. Third Street, Philadelphia, Pa.—24-page bulletin of "Monarch" used and rebuilt presses, threading machines, boring mills, drilling machines, grinders, lathes, etc. Illustrated and priced. Copy free on request.

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Electric Railways in Their Entirety

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DISMANTLING DONE BY US

The Allite Corporation
636-638 Broadway, New York, N. Y.

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New and Relaying Rails

All Weights and Sections

We specialize in buying and dismantling entire Railroads, Street Railways, and all other industrial properties which have ceased operation. We furnish expert appraisals of all such properties.

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Rail Department, Philadelphia, Pa. General Department, Boston, Mass.
Pacific Sales Office—Failing Building, Portland, Oregon

4000 Tons 85-Lb. ASCE Rail

with angle bars in stock ready for immediate shipment. Attractive prices quoted.

M. K. FRANK
15 Park Row, New York, N. Y.

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3—Modern light weight, for sale direct to a street railway, also

Double Truck Snow Plow

All in first class condition.
Interstate Street Railway Company
Attleboro, Massachusetts

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Think "SEARCHLIGHT" *first*

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The Last Word in Modern Cars!

6—Light Weight Double Truck Passenger Cars

two to four years old—weight 30,000 lbs.—excellent condition—ready for immediate shipment.

Railway Motors.
Sweepers and Snow Plows.
Controllers. Compressors.

Reasonably priced.
Let us have your requirements.

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When business judgment dictates the wisdom of abandoning part or all of your electric railway equipment—don't let it rust away in idleness waiting for the chance piecemeal buyer to gradually unburden you, at big losses.

Do the one practical thing. Sell it as a unit to SALZBERG—complete with power plant, track, feeder and trolley wire system and rolling stock.

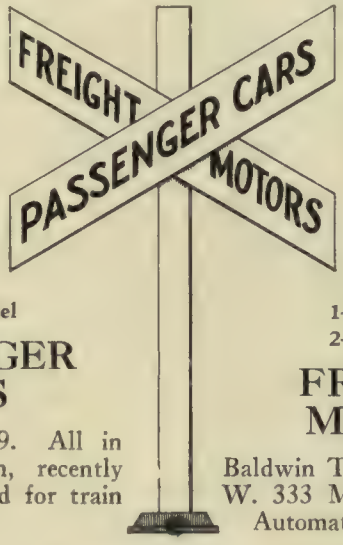
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No obligation for our proposition.

H. E. SALZBERG COMPANY, INC.

225 Broadway — Estd. 1898 — New York City, N. Y.

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Priced Right

12—All Steel

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Seating Capacity 59. All in first class condition, recently painted and equipped for train operation.

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1000 K. W. and 500 K. W. Westinghouse modern type Synch. Motor Generator Sets

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Condition Strictly First Class
For Particulars Apply

JOHN D. CRAWBUCK CO.
Empire Bldg., Pittsburgh, Pa.

MAKE YOUR SELECTION

FROM 173 BIRNEY CARS

(60 May Be Sold)

Built by J. G. Brill Co.; Brill 79 E-1 Trucks; Full Safety Devices.
Either Westinghouse No. 508 or Gen. Elec. No. 264 Motors.
Complete with all appurtenances.

Now in Operation *Splendid Condition* *Low Price*

MORE THAN 20 YEARS AT YOUR SERVICE

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W. M. McKEE CO.
601 Commonwealth Bldg., PHILADELPHIA, PA.



Keeps cars clean

CAR and bus passengers patronize the rapid transit lines that keep their equipment attractive. Dirty seats, windows, floors, fixtures and paintwork should not be allowed to discourage patronage, when everything can be kept clean so easily the economical Oakite way.

Oakite cleaning materials and methods quickly remove grime and dirt from cane, wooden or upholstered seats; rinse away stains and greasy marks from porcelain or enamel fixtures; keep windows clear and sparkling; restore paintwork's original freshness.

Write for our booklet "Oakite for Railroad and Car Shops." It contains scores of formulas for doing car and bus cleaning jobs economically and speedily. Your request for a copy incurs no obligation.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U. S. and Canada

Manufactured only by
OAKITE PRODUCTS, INC., 28B Thames Street, NEW YORK, N. Y.

OAKITE
TRADE MARK REG. U.S. PAT. OFF.
Industrial Cleaning Materials and Methods

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Allite Corp., The 124

78% Cut in Maintenance Cost



$58.50 SAVED—a typical electric railway installation is making this saving on a single job—200 brake-shoe pins formerly cost them $75.00—now their Smith works alone, and the job figures $16.50.

BLACKER "B" Power Sledges always Cut in Half Time and Labor Costs—while doubling Anvil Capacity and Output.

200% INVESTMENTS as used by—

American Car & Foundry Company
American Gas & Electric Company
Aurora, Elgin & Fox River Elec. Company
Beaver Valley Traction Company
Brooklyn-Manhattan Transit Company
Cincinnati Street Railways
City of Detroit—Street Railways
Cleveland Street Railways
Cleveland Frog & Crossing Company
Commonwealth Edison Company
Community Traction Company
Eastern Massachusetts Street Railways
Erie (Pa.) Street Railways
General Electric Company
Hayes Track Appliance Company
Jenkins Vulcan Spring Company
Lehigh Valley Transit Company
Long Island R. R.
Milwaukee Electric Railway & Light Co.
New York Central R. R.
Northern Pacific R. R.
Page Steel & Wire Company
Philadelphia Rapid Transit Company
Pressed Steel Car Company
Public Service of New Jersey
Rockford Electric Company
St. Louis-Southwestern R. R.
Schenectady Street Railway
Stone & Webster Engineering Company
West Penn Power Company
Westinghouse Electric & Mfg. Company
Wilkes-Barre Railways

YOUR MAINTENANCE COSTS can also be Cut in Half—no obligation in sending for the full story—let us mail you this Folder at once—return the coupon today.

POWER BLACKER HAMMERS SLEDGE

BLACKER ENGINEERING CORPORATION GRAND CENTRAL TERMINAL NEW YORK CITY

HAMMERS BLACKER POWER BLACKER SLEDGE BLACKER HAMMERS

BLACKER ENGINEERING CORP.
Grand Central Terminal, New York City.

Gentlemen:

We have.....Blacksmiths and.....Helpers.

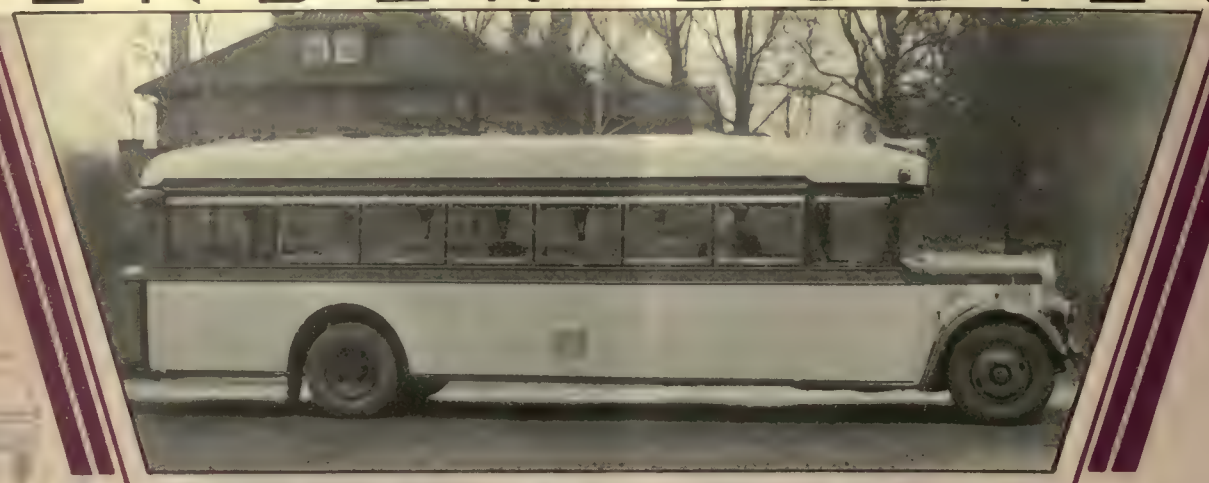
Without obligation to us, you may send me your new Booklet on your BLACKER "B" POWER SLEDGE.

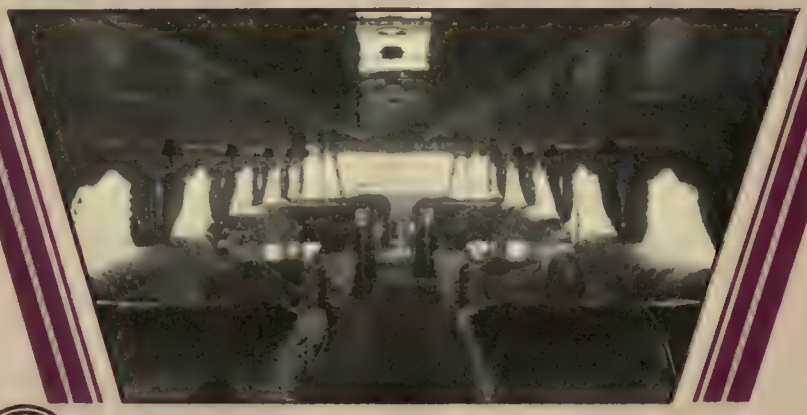
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Title

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Company

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Address

B·E·N·D·E·R ··· B·O·D·I·E·S





Charter Business Grows

as operators adopt the new

BENDER CLUB COACH

CHARTER BUSINESS is profitable business. The Bender Club Coach has been especially created to increase your opportunities for this business . . .

. . . for regular operation of extra fare de luxe coaches, special trips for suburban theatre goers, conventions, special excursions, sight-seeing tours.

Look at it as critically as you please. What beauty of line—how trim, yet how commodious! Clear view in all directions . . . complete protection with non-shattering glass all around. All luggage carried in *inside* overhead luggage racks.

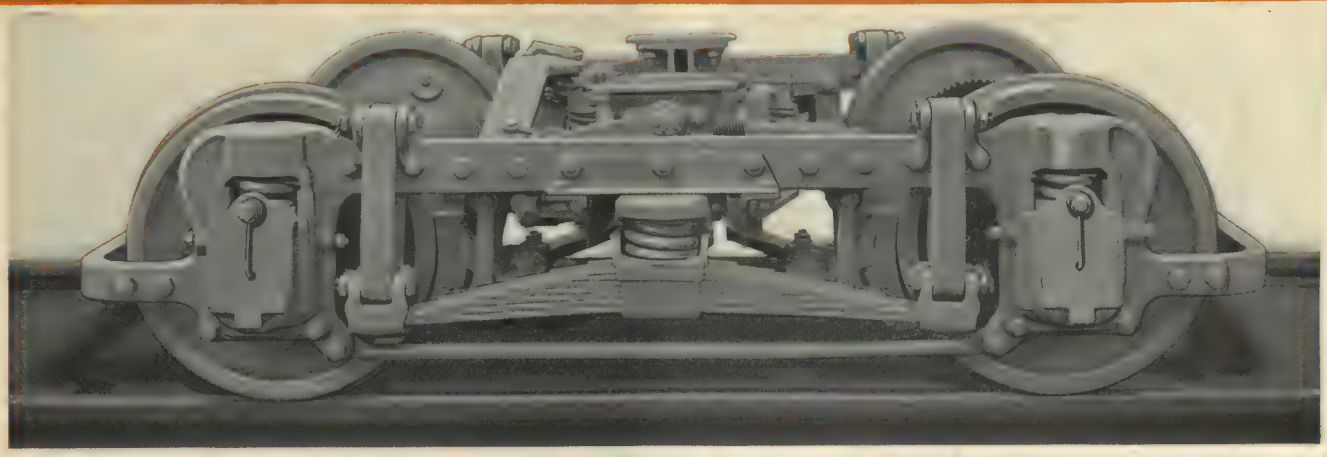
Not a single comfort feature has been omitted. Luxurious divans and lounges deeply upholstered in beautiful and durable cloth or leather. Magazine stand and writing desk. And radio, too—if you want it. Actually a drawing room on wheels! Seats 25 passengers.

You, too, can profitably add this revenue producing unit to your line.

THE BENDER BODY COMPANY, W. 62nd & Denison, Cleveland, Ohio

B·E·N·D·E·R ··· B·O·D·I·E·S

Investigate Their Performance Everywhere



Popular No. 177-E Type

BRILL

Write for Brill Bulletin No. 306

CONFIDENCE

Increasing activity in car and truck purchases—large orders placed within recent months—indicate but one thing—CONFIDENCE in the industry's future. Incidentally the usual preference shown for Brill equipment—particularly in quantity purchases — apparently shows continued CONFIDENCE in its satisfactory performance.

Maintenance ceases to be a problem with

BRILL TRUCKS

HASKELITE



HASKELITE arch roof on car built by the Cincinnati Car Co., for the United Traction Co., Albany, N. Y.

HASKELITE ROOFS

cut operating costs

SINCE the energy consumed in electric operation varies almost directly with the weight, any saving in dead weight represents a direct saving in operating costs.

An efficient and popular means of saving considerable weight in car roofs, side panels, and floors, is the use of HASKELITE—the blood-albumin glued plywood—and its metal-faced companion, PLYMETL. The car illustrated above is a typical recent example of lightweight construction. The Cincinnati Car Company, builders, shows HASKELITE for the roof. Complete construction details are given in the description published in this magazine recently.

Roof panels of HASKELITE can be furnished molded to any desired curvature, to simplify roof construction. The material itself is lightweight, strong, stiff, and is unequalled for water resistance.

Engineering data on both products and their applications to street car and bus construction gladly furnished.

PLYMETL 48-in. x 144-in. is a stock size.

TRAVEL BY AIR HASKELITE USE AIRMAIL

PLYWOOD HASKELITE PLYMETL

HASKELITE MANUFACTURING CORPORATION
120 South LaSalle Street, Chicago, Illinois
There is a Representative in your Territory.
Name on application.

PLYMETL

ERJ4—Gray

BOUND BY
HNM